THE FIGHTING SHIPS AND THEIR WORK

BY

E. S. BELLASIS, MEM. INST. C. E.
(AUTHOR OF "HYDRAULICS", "THE SUCTION CAUSED BY SHIPS", &C.)

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PREFACE.

The object of this book is to give information — hitherto obtainable chiefly from scattered articles in Encyclopedias, periodicals and the like — concerning Ships of War of all kinds, their weapons and their work.

A further object is to assist, in some measure, in making forecasts as to the future, a matter of very great interest just now. Another is to draw attention to various naval dangers to the British Empire which have occurred or are occurring. The public must see to them. Governments — except under pressure — do only what suits them.

Examples are given from all recent naval wars; and particularly, of course, from the Great War of which all the chief Naval events are described.

One of the potential dangers above alluded to arose in connection with a change in the Law of the Sea. This subject, including as it does the highly important matters of contraband and blockade, is duly dealt with. I beg to thank Sir Francis Piggott for kindly revising the articles.

An Index is supplied so that the references to any particular matter can easily be traced. Any very recent developments are given in the Appendices.

GUILDFORD. E. S. B.

10th Feb. 1923.

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CHAPTER I.

NAVAL AFFAIRS.

The "naval policy" of any country, or the general course of action which it adopts in naval affairs, depends of course on its circumstances. It includes the questions of the strength and character of the fleets which it maintains, of the provision of yards where ships can be built and of "naval bases" where they can be stationed, supplied, repaired and "refitted"; and of arrangements for reserves of men which can be drawn upon in time of war. These questions turn on political considerations, on what enemy will probably have to be met. A South American Power may need a navy only as strong as that of a neighbouring Power, and the existence of large navigable rivers may require that a large proportion of the ships shall be gunboats. Not very many years ago Great Britain had a Channel Fleet and an Atlantic Fleet but her strongest fleet was in the Mediterranean, based on Malta. Germany, rapidly increasing her navy and making great bases in the North Sea, became a menace of the gravest kind. Her action not only caused Great Britain to increase her own navy but to adopt a re-grouping of it. She established a new naval base at Rosyth on the Firth of Forth and kept a great Home Fleet in British waters, reducing the strength of the ships on the Atlantic and Mediterranean stations. The ships based on Gibraltar could reinforce either those at Malta or those in British waters. The above arrangement was carried out by

Great Britain the more readily because of the generally friendly nature of her relations with France, the United States and some other Powers. Nelson said that the probable fighting ground of a fleet should be its drill ground. The chief British drill ground became the North Sea.

Again, naval policy depends on the extent of a country's colonial possessions and of its maritime trade. Most nations depend for their prosperity, and some almost for their existence, on such trade. Europe draws vast supplies of food grains, wool, cotton, cattle, meat, coffee, nitrates, rubber, sugar, tea and fruit from North and South America, Australasia, India, China and the West Indies. Most countries, at least before the Great War, received manufactured products from Great Britain, Germany and the United States. Great Britain depends on maritime trade for the greater part of her food supply. The British Empire is an association of States whose highways of communication are ocean highways. Attacks on enemy seaborne property have always formed part of the operations of sea warfare, each belligerent endeavouring to preserve its own property and its own trade while capturing or destroying that of the enemy. Distant colonial possessions require local naval forces sufficient at least for their temporary defence. Maritime trade requires cruisers to protect it. All this involves the provision of local naval bases. Naval bases have to be fortified, equipped with docks, workshops and appliances, and supplied with stores. Besides regular bases, there are coaling stations. Coaling at sea, first accomplished more than thirty years ago, was first carried out on a large scale in the case of the Russian Fleet which in 1905 steamed from the Baltic to the Far East, and obtained coal from neutrals. Great Britain, besides the great European bases and

numerous stations in the Dominions and New Zealand, has coaling stations at Perim, Aden and Singapore; and in North Borneo, New Guinea, Fiji and many islands in the Pacific.

Every country, besides having a definite scheme as regards ships and general naval preparations, draws up or ought to draw up strategic plans ready for execution when war breaks out with each possible enemy. These, of course depend greatly on what the enemy is likely to do. A study of this is essential and it depends largely on good "intelligence".

In time of war the naval bases of an enemy have to be watched so that the movements of his craft may be noted. The further apart the bases are the more difficult they are to watch. It is, for instance, a disadvantage to Germany that her North Sea naval bases are so close together. On the other land, for financial reasons, the number of bases must not be too great. Harbours must now be protected by means of booms and other arrangements against the entry not only of destroyers but of submarines. During war temporary bases may have to be established.

In any country with a large navy there must be ample facilities for shipbuilding. One way of obtaining these is to encourage private building yards. The number of ships to be maintained in full "commission" and the number to be maintained with "nucleus crews" — a system which was started by Lord Fisher and has been successful in Great Britain — have also to be carefully considered. A nucleus crew contains the most highly trained men and may be about half of the total crew. In Great Britain every new ship is commissioned as soon as she is ready for sea. It was pointed out at one time that, owing to a run of accidents, the number of battleships actually available in British waters was

less than that in Germany. Sufficient allowance for accidents has to be made. The life of a battleship in peace time is supposed to be some twenty years. The scrapping of ships after they have become old should be carried out with caution and with due regard to the probabilities of the immediate future. One important reason for scrapping them is that otherwise they would use up men and funds which could be better employed on more useful ships. But a ship can be struck off the list without being immediately broken up. When the Great War broke out, many British ships which had been struck off the list or even sent away to be broken up, were again put into commission or brought into use in some capacity or other.

It is necessary to maintain the proper proportion of each kind of ship having regard to the circumstances of the country concerned and of the naval strategy which it is likely to adopt in a war. Besides the battleships with their big guns, there are cruisers of various kinds, torpedo craft, aircraft and submarines each with multifarious functions. At one time France built too few battleships and relied on torpedo boats, a policy which had to be abandoned and the building of big ships undertaken. At one time Great Britain neglected to provide sufficient light cruisers and destroyers. At another time she signally failed to push on the building of warships with sufficient rapidity and Germany became relatively too strong. Great essentials are watchfulness and care and a proper grasp of the potentialities of any particular line of action. Immense service to Great Britain was done by Lord Charles Beresford who on various occasions aroused the country to a sense of an unsatisfactory or even dangerous state of naval affairs, due generally to a desire for economy which again was brought about by the influence of party politics. Similar service has

been rendered by Lord Sydenham and by Mr. Thomas Gibson Bowles. A quite recent instance of danger is that of the Naval Prize Bill — authorising the acceptance by Great Britain of the Declaration of London — which might have become law to the huge detriment of this country. The public must never relax their watchfulness over these vital matters. In this case there was no question of party politics. There was simply a failure to grasp the potentialities of the measure (Chap. IV, art. 2).

To obtain a reliable source of supply of men the best policy is to encourage a mercantile fleet manned chiefly by men who are not foreigners. In Great Britain there is a Fleet Reserve consisting of men who have spent some time in the Navy. The Royal Naval Reserve consists of selected officers and men in the merchant service. There is also the Royal Naval Volunteer Reserve consisting of officers and men who have, since 1903, given up time after their ordinary day's work on land, to learn the work they will do in case of war. All the above are, on the outbreak of war, drafted into the Navy. Vast numbers of men were obtained during the recent war from the fishing fleets of trawlers and drifters.

The necessity for extreme care in the selection of officers and men and for unremitting attention to questions of organisation, equipment, material, discipline and training is of course well known. Gunnery practice and periodical naval manœuvres hold important places. Owing to the multiplication of machines of all sorts the training given to all ranks has to be largely mechanical. But in Naval as in other matters, training depending on pre-arranged courses is by itself insufficient. It does not supply the variety of experience, the sudden dealing with the unexpected. Thus

sea-going experience is of incomparable value. Admiral Sir Cyprian Bridge in discussing the naval aspects of the twenty years of Napoleonic war, remarks (Encyclopaedia Britannica, art. "Sea-Power") that the almost uninterrupted successes of the British were not due to discipline and organisation, for in those the French were on the whole as good, while in the latest stages of the war the French were far ahead in organization, "science" and in every branch of training that can be imparted without going to sea. The real cause of the British success was that the French fleets had been shut up in their ports and had been less and less sea-going as the war advanced, while the British was a thoroughly sea-going navy, its personnel constantly acquiring new experience, and improving in seamanship. Another matter which always needs attention is research.

Neglect of a few of the above matters, even of one, may lead to disaster. In some countries, owing to lack of funds or from other causes, neglect of some important item or items has occurred and there has been a great naval failure (Chap. V. arts. 5 and 6). When everything is properly attended to, the skill and experience thus acquired engender mutual confidence among all ranks. This is one of the secrets of the powerful factor known as morale, though it depends largely on racial qualities and can be strengthened by victory and shaken by defeats or weakened by inaction and avoidance of the foe. An evil to be guarded against is overconfidence and self-sufficiency. This has, as will be seen, led to something like disaster.

Although the British Isles, with their northern outpost in the Shetlands, lie right across the exit from the Baltic; although, holding Gibraltar, Great Britain can divide the forces of any Power or group of Powers having ships in the Atlantic — or Baltic — and in the

Mediterranean; although in Malta, Egypt, and Aden she holds the gateways of the East; yet in view of her vast possessions and gigantic trade, she requires a Navy whose strength shall be very great. It was once decided that the British Navy must have a strength equal to that of the combined strengths of the two next greatest Powers. This "two to one" standard for long maintained the peace of the world. The idea was, however, allowed to drop, and the standard adopted was 60 per cent in excess of Germany's strength. Even this was not maintained. The outbreak of the Great War found Great Britain not only deficient as regards destroyers, and other small craft, but it found her without sufficient means of building them rapidly. Once again had "economy" prevailed. To that great seaman Lord Fisher is due the credit of starting a programme to set matters right. Other grave defects or dangers have been mentioned above and more will be mentioned below (Chap. III. art. 3, Chap. IV. art. 2, Chap. VI. arts. 1 and 6 and Chap. VII. art. 2).

In very many of the important points affecting the designs, armaments, equipment and management of fighting ships Great Britain has taken the lead and other nations have followed suit, though in some cases they have taken their own line and there is of course endless variety in details.

The following is a list of the greatest naval Powers, in approximate order of their naval strengths before the Great War.

1 Great Britain.	5 Italy.
2 Germany.	6 Japan.
3 United States.	7 Russia.
4 France.	8 Austria-Hungary.

The strengths of the fleets employed during the war are given in Chapter VI, art. 1, and of the fleets now existing in Chapter VII, art. 2.

CHAPTER II.

WEAPONS AND APPLIANCES.

Art. 1. The Principle of the Gyroscope. The chief weapons used in naval warfare are the gun, the torpedo and the mine. The principle of the gyroscope enters into more than one of them and into some other instruments used in ships, and it is therefore desirable to explain it — briefly — at the outset. It is a matter of common knowledge that a top, whether it is perfectly upright or not, will maintain its position while it is spinning fast, but will fall when it slows down. This is an illustration of "gyroscopic force" the curious force which is developed in a wheel or other revolving body. The force resists any change in the angle of the "axis" around which the revolution occurs. In the case of the top it does not resist the shifting of the top from one part of the floor to another, nor, if the top is spun on the palm of the hand, does it resist the raising or lowering of the hand. But it will not allow the top to tilt over.

The elongated bullet fired from a rifle would not, if fired from a smooth-bore, travel very far with its point first. It would roll over and over, its range would be affected and the accuracy of the fire destroyed. To prevent this happpening the "barrel" of the rifle is grooved. The grooves run right along the barrel and are parallel to one another but they twist. Parts of the bullet are forced into the grooves, so that the bullet revolves as it travels along the barrel. It may make only one turn while in the barrel but, owing to its high velocity,

it continues to revolve during the whole of its flight and, owing to the gyroscopic principle above enunciated, it travels point first all the time. The same arrangement is made in all kinds of big guns. Owing to there being a number of parallel grooves the strain does not all come on one groove, or on one part of the projectile.

In the torpedo, a flywheel revolving at a very high velocity, is introduced. It is known that a car resting like a bicycle on only two wheels, one behind the other so as to run on a single rail, can be prevented from falling over, even when it is stationary, when it is furnished with such a revolving wheel. In the case of the torpedo the wheel has to act not on the torpedo itself but on rudders. The axis of the wheel is set parallel to that of the torpedo, but this parallelism can very easily be disturbed because the axle of the wheel rests on a frame which can turn on a vertical pivot. If the torpedo deviates, even slightly, to the right or left of the course on which it has started, the axis of the wheel does not deviate appreciably. Owing to the gyroscopic principle it remains where it was. Thus its position relatively to the axis of the torpedo is altered and this causes the rudder to be actuated and the deviation of the torpedo to be rectified. This recurs at any and every deviation.

There is also a "gyroscopic compass". In this the position of the needle, having once been fixed, is maintained by a rapidly revolving wheel. This compass has nothing to do with magnetism, and is consequently not subject to certain disturbances which are liable to occur, particularly in submarines. A gyroscope also forms part of one of the systems of "fire control" of ships (Chap. III, art. 1) and of arrangements for preventing or reducing the rolling of passenger ships.

Art. 2. Guns. The big naval gun has shared in the general increase in size, power and destructiveness which

has for a long time been a feature of warships and their armaments. The size is designated by the internal diameter which is termed the "bore" or "calibre". The largest gun which is at all common is the 15-inch though there are some larger. A few years ago it was the 12-inch, and this size is still very common. Short guns having a bore of about 16 inches were in use in the British Navy thirty years ago. They were superseded, when smokeless powder came into use, by a longer 12-inch gun which gave better results. The guns of any particular calibre are not, even in one country, all alike. There are differences in length and weight and consequently in power. The length is generally stated in calibres. It may be as much as 55 calibres. The material is toughened steel. The "muzzle velocity" of the projectile may be more than 3,000 and is always more than 2,000 feet per second. A "round" of ammunition consists of the explosive or "propellant" and the projectile, sometimes called in the Navy a "proj".

Taking guns of all sizes from the biggest down to a rifle whose bore is less than a third of an inch, the muzzle velocities do not differ excessively. The reason why the bigger gun has — if the muzzle velocities are supposed equal — the greater range is that the bigger projectile is less affected by the resistance of the air.

Figures concerning some of the guns used in the British Navy are given below. During the war an 18-inch 45-calibre gun was introduced. It throws a projectile weighing, 3,300 lbs. or very nearly a ton and a half. A 50-calibre 5.5-inch gun was also introduced and used on the Hood, its projectile weighing 82 lbs., the gun 6 tons 4 cwts.

Calibre of gun	6	7.2	9.2	12	13.5	15	inches.
Weight of gun (approx.)	8	16	28	66	76	200	tons.
Weight of projectile . .	100,	200,	380,	850,	1250 or 1400	1950	lbs.

Besides the gun itself there is the heavy "mounting" for holding the gun in position, enabling it to be "trained" to different directions and its "elevation" to be altered, and providing for the shock due to its recoil when fired.

The weights of the projectiles of some foreign guns are as follows:

Calibre . . .	6	8.2	11	12	14 inches.
Germany . .	101	275	660	860 to 980	lbs.
United States.	105			870	1400 to 1660 lbs.
France . . .				660 to 975	lbs.

A 16-inch gun is being used in the new United States and Japanese battleships, the projectile weighing about a ton.

Figure 1 shows a portion of the circumference of the earth and its approximate "dip" below a straight line touching it at the point marked O. The dip is nearly as the square of the distance from O. At one mile the dip is about two-thirds of a foot, at two miles four times as much, or 2⅔ feet, at three miles nine times as much or 6 feet. An observer on a battleship at A, about 30 feet above the sea level, could just see another at B, also 30 feet above the sea level, and distant some 14 miles. He could not see much of the ship at B. It would be "hull down". Moreover the "visibility" at sea is often far from good owing to haze or mist. An observer up in the tops could however see the other ship if the visibility was good enough. The two ships, even if within range of each other's guns, could not easily hit one another even in the clearest weather. On land a big naval gun has been used for bombarding a town 20 miles distant. In recent sea battles large ships carrying guns of 11 to 15 inches have opened fire on one another at ranges of 11 or 12 miles. The Queen Elizabeth, firing with a 15-

inch gun over the Gallipoli Peninsula, hit a Turkish transport at 20,000 yards — 11½ miles — at the third shot. The miles spoken of in this paragraph are British statute miles. For nautical miles see Chapter III. art. 2.

The range is ascertained approximately by a "range finder" which is made with great accuracy and depends on the following principle. Let AB (Fig. 2) be a known length or "base" and let C be the enemy ship. The angles at A and B made by the lines of sight, AC and BC, can be observed and the distance of C can then be got from tables. But when C is far distant the lines AC and BC meet at an extremely small angle and the least inaccuracy in reading the angles causes a considerable error in the distance. The greater the length of the base AB the greater the accuracy. In firing from a fort AB can be of great length, on a ship not so. In a range-finder as constructed there are two telescopes, one at either end of the base. In a "single observer" range-finder the two telescopes have a common eye-piece mid-way between them, and there are reflectors which divert to this eye-piece the rays of light from the two object glasses. Thus a single observer looks simultaneously through both telescopes. There are several varieties of this type of instrument. In one variety the two images are divided by a fine horizontal line (Fig.

FIG. 1.

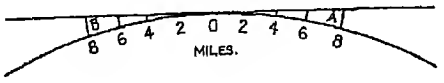
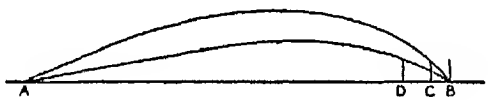


FIG. 2.

FIG. 4.



3, Chap. III. art. 3). The two images — shown in the figure as not quite coincident — are, by means of the mechanism of the instrument, made to coincide. This mechanism at the same time moves a scale on which the range is read off. Early in the war the battle ranges were often some 18,000 yards. At the battle of Jutland they were 20,000 yards, but the base of the range finders on the British ships seldom exceeded 9 feet. This was suitable only for much shorter ranges. The German range finders were better than the British. Not long ago a 30-foot range finder — the probable error at 20,000 yards is only 80 yards — was exhibited by Messrs Barr & Stroud of Glasgow. Their pamphlet describes numerous types.

As soon as firing begins, the great splashes or columns of water caused by the bursting shell are watched for and the elevation and direction of the gun corrected accordingly. If necessary — as when firing at anything on land or firing at a ship over a piece of land — an aeroplane is employed to "spot" and signal where the shots have fallen. Spotting by aircraft is also most useful in cases of bad visibility such as may occur in an action owing to smoke screens or smoke generally. After a few shots — or perhaps at first — the shots may "straddle" the enemy ship, that is, fall some on the near side of her and some on the far side. When this happens the correct range is quickly obtained.

The maximum range of a gun is obtained by giving it a great elevation. If there were no air resistance the angle of elevation for maximum range would be 45°. Actually it is about 40°. It varies slightly for different guns. On a ship there are difficulties in giving guns great elevation. The maximum elevations of guns in British ships used to be 15° or thereabouts. The German guns had far greater elevations and this gave them a great range. Of late years the elevation has been increased in new British ships and is

now 30° or in some ships 40°. The Germans, in 1916, had guns with 30° elevation in ships which were not new. The ranges of guns are not published but the range of one pattern of 12-inch gun with 15° elevation is 16,000 yards, with 30° it is 24,000 yards. If the maximum elevation on a ship is not great it can sometimes be increased by giving the ship a "list". Even the rolling of the ship can, on occasion, be similarly utilised. If the ship is accidentally listed the gun may be put out of action.

The 18-inch, 45-calibre gun on a British monitor, when elevated to 45°, had a range of some 50,000 yards (28 miles). The actual fighting range was often nearly 40,000 yards (over 22 miles).

The upper curved line in Fig. 4 shows approximately the "trajectory" of a projectile fired from A with a great elevation of the gun. The height to which the projectile rises may in such a case be about a quarter of the range AB. If there were no air resistance, the highest point would always be in the middle. Actually the air resistance continually retards the projectile and it falls at a steeper angle than that at which it rises. The same projectile fired from A with a higher muzzle velocity would, in order to reach B, be fired with a smaller elevation and its trajectory would be somewhat as shown by the lower line. A bigger projectile with the same muzzle velocity as the first would also be fired with a smaller elevation than the first. It has been mentioned that the lighter the projectile the greater is the retardation caused by the resistance of the air. The reason of this is that the "driving force" of a projectile flying at any given speed, is greater as its weight is greater, but is less as the area presented to the air is greater. Comparing a small projectile with others of a greater size — the shapes of all being similar — the weight increases faster than the area, and therefore the driving force increases and the bigger projectile parts with its velocity

more slowly. A small pellet of shot cannot be thrown by hand as far as a bullet. Similarly the smaller projectile is more affected by wind and by variations in the density of the air. The bigger the gun the greater the accuracy of fire.

Let the vertical line at B represent a ship which is struck at the waterline. It will be struck high up if shifted to C in the case of the upper trajectory or to D in the case of the lower. The distance B C or B D is called the "danger space". It is greater the flatter the trajectory. It is greater the smaller the range. It is greater for a big gun than for a smaller one, if the muzzle velocities are the same. The greater the danger space the greater the chance of a hit.

If a gun were suspended from some point overhead, by a chain, and loaded with a shot as heavy as itself, it would, when fired, be driven back with as great a velocity as that imparted to the shot. The greater the weight of a gun the heavier the shot which it can fire without undue recoil. In comparing the figures for the 12-inch and bigger guns given in the table above, it will be noticed that the weights of the later guns (the 13.5-inch and 15-inch) are not increased in anything like the same proportion as the weights of the projectiles. If they were so increased and also the charge of "propellant" increased so as to make the muzzle velocity of the projectile not less than before, the range would be increased. But this was considered unnecessary. Actually the muzzle velocities are reduced and the ranges of the three biggest guns just mentioned do not ordinarily differ much. The reduction of the muzzle velocity reduces the wear of the gun. It does not necessarily reduce the velocity at an advanced point of the flight because, as has been seen, the effect of air resistance is less for the bigger projectile. Thus for the bigger projectile the danger space at a given range is no greater than for a common

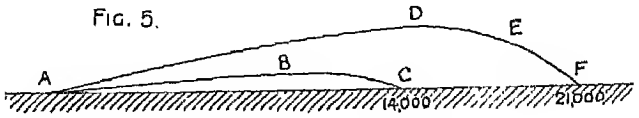
smaller projectile, but the flight of the projectile is, as above explained, subject to less accidental disturbance, and of course the destruction wrought by the heavier projectile is far greater. These are the considerations which have caused a steady increase in the sizes of big naval guns. During the war Lord Fisher had the drawing of a 20-inch gun ready.

The exact form of the trajectory of a projectile can only be found by long calculations and references to "range tables" and the same applies to the time of flight. Some rough general ideas can, however, be given. The maximum height to which a projectile rises is approximately 4 t^2 where t is the time of flight. Thus if t is 30 seconds, the height is 3,600 ft. Supposing the muzzle velocity to be 3,000 feet per second, the time taken by a 12-inch projectile in traversing a range of 15,000 yards may be some 20 seconds. The increase in the length of the trajectory due to its curvature, that is to the rise of the projectile, is only slight, and if the muzzle velocity had been maintained throughout the flight, the time would have been only slightly more than 15 seconds. The actual velocity at the end of the flight is far less than the initial velocity.

The angle of descent of a projectile is a matter of deep interest especially in view of some recent occurrences. In Fig. 5 are sketched the trajectories of a projectile for two ranges. At 14,000 yards the angle of descent is comparatively small. At B the velocity is less than at A and the angle of descent at C is greater than the angle of elevation at A, but both may be small. For a range of 21,000 yards the case is very different. At D the velocity is less than at C. At E it is further reduced and its "horizontal component" becomes lessened because of the steep inclination of the path, while the "vertical component" keeps increasing like that of any falling body. At F the angle of descent

is far more than it was at C. The ratio depends mainly on the bore of the gun, but also on the length of the gun, on the weight of the projectile — which, as has been

Fig. 5.



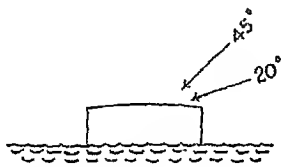


Fig 6

seen, is not always the same for a given bore — and on the muzzle velocity. It has been seen that a small difference in the bore causes a great difference in the weight of the projectile. The 660-lb. projectile of the 11-inch gun becomes 850 lbs. when the bore is increased by an inch. This is, of course, because the projectile is increased in all three of its dimensions and not in one or two only. To hit a given mark the smaller projectile has to be fired at a higher angle. For a 15-inch gun at 20,000 yards the angle of descent may be some 22°, for calibres of 12 and 11 inches the angle may be about 22° at 15,000 and 13,000 yards respectively.

Again if a heavy projectile is fired with a small charge of propellant and a high angle of elevation the projectile will fall steeply at a fairly short range.

Let Fig. 6 be supposed to show roughly the width of a ship with relation to the height of free-board. At short range the hits would be on the side of the ship. At long ranges, when the angle of descent of the projectile is great — it may be 30° or even more — the hits are more likely to be on the deck than on the side, and the more

steeply falling projectile has an advantage, especially if the deck has very thin armour or none at all, and if the turret roofs are thin. Given a long range, the advantage, as regards deck hits, is with the smaller projectile because it falls more steeply. As already remarked, the destruction wrought is greater for the heavier projectile but, given the total weight of guns, the smaller the projectiles the greater their number and this of course increases the chance of hits.

An interesting question is that of "salvoes" or the simultaneous discharge of several guns at one object. If all the projectiles fall near together the salvo is said to be well "bunched". It is not difficult to see that if two shells fall near one another and burst simultaneously, the effect is greater than if they had fallen far apart, or had not burst simultaneously. A blow from a 10-lb. hammer has more effect than the blows, unless exactly simultaneous, from two 5-lb. hammers. Thus the effect of a salvo is greater the better it is bunched. The moral effect is also greater. The question of concentrating fire on a particular ship will be considered later (Chapter V. art. 3).

When a gun is fired, the pressure caused by the explosion tends, of course, to enlarge the diameter of the barrel. Actually it does enlarge it momentarily to a minute extent. If the barrel is made of one piece of thick metal the momentary enlargement of the exterior part may not be more than is safe, but the compression of the metal may allow the interior part to enlarge to a degree which is damaging to it. To remedy this the interior "tube" is made separately and it is "in compression" instead of being "neutral" when the gun is not being fired. It is thus not liable to get more than its proper share of the strain resulting from the explosion of the charge. Another advantage of this plan is that when the interior becomes worn the tube can be removed and replaced by a new one.

The total thickness of the barrel of a gun has to be greatest at the breech end and least near the muzzle. This can be arranged by adding exterior tubes of varying lengths, one over another. All are of course turned and bored with extreme accuracy. The tube which comes immediately over the interior tube is of such a size that it can only be got into its place when expanded by heat. In cooling it contracts and grips and compresses the interior tube. But if nothing more were done it would, owing to its longitudinal contraction, compress the inner tube longitudinally while itself being stretched longitudinally. To prevent this there is an arrangement of gas jets and water jets by which it can be kept hot at one end and cooled at the other, the jets being shifted along. Further tubes are added in the same way.

In Great Britain and some other countries the big guns are "wire wound". Round the inner tube is wound a band of extremely strong flat steel of about the size of the whale-bone used for corsets. There may be scores of miles of this "wire" on a big gun. Over the wire comes a tube, but the compression of the inner tube is caused chiefly by the wire.

When a gun has fired a certain number of "rounds" — perhaps 100 or 150 in the case of the biggest guns — the rifling of the barrel becomes worn and the firing less accurate and the gun has to be fitted with a new inner tube.

This wearing out of the gun is the greatest difficulty which attends the use of big guns. The life of the gun — or of the inner tube — considered as being the time it is doing work, is an affair of seconds. A rifle two feet long can be fired perhaps 2,500 times, the passage of the bullet down the barrel occupying say the five-hundredth part of a second on each occasion. The total time is five seconds. In a big gun fifty feet long which can be fired only 100 times, the passage each time may occupy per-

haps one twenty-fifth of a second and the total time be four seconds.

After the charge has been inserted in a gun, the breech is closed by a heavy breech block which is secured by one device or another, the principle being generally that of the screw or wedge.

A big naval gun can be fired perhaps once a minute. This may be taken as a rough approximation. Better results have been obtained on the "proving grounds" where the guns are tested, but on a ship the conditions are not the same. The smaller the gun the more rapidly it can be fired. The 6-inch gun can be fired perhaps six times as fast as the 12-inch gun. In this case the total weight of projectile which it could throw per minute — supposing the weights to be those given above — would be about 70 per cent of the weight thrown by the 12-inch. For the other guns the percentage would be rather higher. Old guns, such as some of those in old ships used in the war, are slow in working.

The propellant used for naval guns was formerly gunpowder. This caused much smoke, which was liable to obscure the sighting of the gun for the next round. Gunpowder required a gun heavily built near the breech end and thin towards the muzzle. It had a shape something like that of a soda-water bottle. Gunpowder has for a good many years been replaced by a compound of nitro-glycerine and gun-cotton. This is smokeless and "slow-burning" and requires a long gun and one in which the thickness of metal at breech and muzzle does not differ so much. The particular variety of the compound used in the British and some other navies is known as "cordite" because it is, when nearing the final stage in its manufacture, pressed through holes in a plate and comes out in the form of a cord which is dried and made up into charges.

The chief projectile used is common shell which is of steel, contains a heavy charge of "high explosive" and is extremely destructive when used against most parts of a ship. High explosives are far more violent in their action than the propellants used for driving projectiles out of guns. The shell bursts into a great number of fragments which are driven in all directions. There is also armour-piercing shell which is of steel, contains only a small bursting charge of high explosive but has great thickness of metal. The reason why it is not more used is that at long ranges it is impossible to make sure of hitting those parts of a ship which are protected by thick armour. Armour-piercing shell is made of a special steel and is tempered specially. It is a curious fact that in order to penetrate thick armour, instead of breaking up on striking it, the nose of the shell has to be softer than the rest of it. Both kinds of shell are exploded by the impact when they strike. There is also a solid projectile called armour-piercing shot. Again there is shrapnel shell which contains bullets and is used when firing on bodies of men. It is usually exploded by a time-fuse before it strikes but may be exploded by impact. In a "delay-action" shell or bomb the explosion does not occur immediately on striking but is delayed to an extent which can be regulated. The shell or bomb may then penetrate the side or deck of a ship before it explodes.

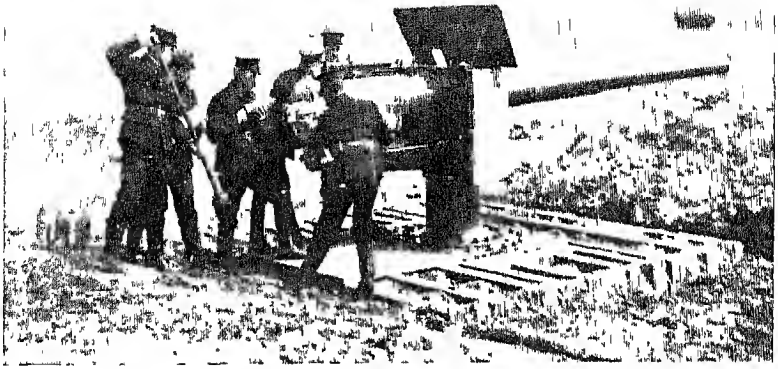
Some of the smaller guns used on warships are the 5.5-inch (French); 4.7-inch, 4-inch and 3-inch (British); the weight of the shell being 66 lbs., 40 lbs., 25 lbs. (or 31 lbs.) and 12 lbs. respectively. There are also "6-pounders" and "3-pounders". All the above are "quick-firers". Large ships carry "field guns" which are used for shore work, one or two anti-aircraft guns — which are generally 3-inch but sometimes 4-inch, and can reach a height of 25,000 feet — and machine guns which fire ordinary rifle bullets.

The German gun, "Big Bertha", used for bombarding Paris was a worn-out 15-inch gun, into which was inserted a heavy tube over 100 feet long and having a bore of about 8 inches. The length of the projectile was very great and also the charge of propellant. The life of the tube was probably short. When worn out it could be re-bored to a larger diameter. The elevation was about 45°. The muzzle velocity of the projectile was probably 4,500 to 5,000 feet per second, and it reached a height — 20 miles perhaps — where the air is thin and its resistance slight. The range was thus more than 70 miles. Of course nothing smaller than a large city could be hit, and the gun was thus practically used against the civilian population. One shell from it crashed into a church and killed a great number of people.

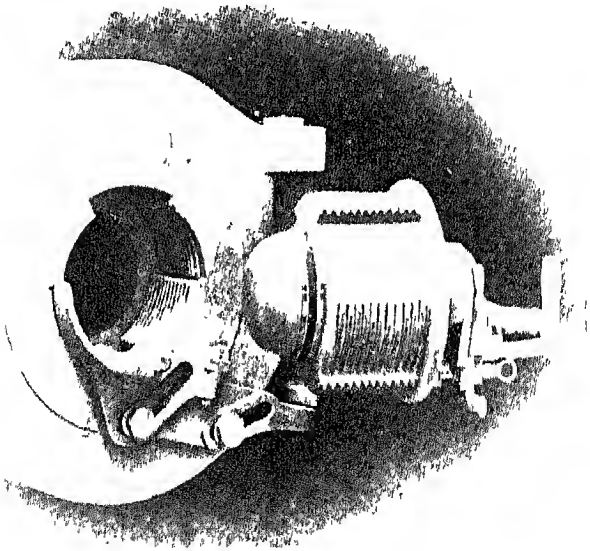
Some further remarks on guns and gunnery are given in the accounts of the Coronel and Jutland battles. (Chap. VI. arts. 3 and 6).

Art. 3. Torpedoes. This engine of destruction, invented many years ago but greatly improved in recent years, has a general shape something akin to that of a fish. It has a blunt rounded head and a cylindrical body tapering gradually to the after end. This shape has been found to be the best, both for speed and steering. A torpedo is discharged from a tube as a shot is fired from a gun, but far more gently. The discharge, which is effected by means of compressed air or a small charge of explosive, starts it on its way and sets in motion the internal mechanism by means of which it continues its journey and achieves its end, which is the blowing in of the side of a ship.

A torpedo is driven by twin screw propellers at its after end. It is provided with fins to prevent it from rolling. The propellers are actuated by an engine driven by air which is compressed to an extremely high pres-



4·7 Naval Gun, Firing. Proving Ground, Eskmeals, Cumberland.



Breech mechanism for 6-inch 45-calibre Vick-

sure, say 2,000 lbs. per square inch, the part of the torpedo containing the air being made of very strong steel. The firing of the torpedo from the tube opens a valve which admits the air to the engine. In its passage to the engine the air is heated by means of oil fuel which is ignited when the torpedo is discharged. This heating of the air increases its pressure. The air after acting on the engine escapes from the torpedo and forms a line of bubbles or foam on the surface of the water. The torpedo is somewhat in advance of the bubbles. The bubbles can be seen in the day time and the ship can thus in many cases evade the torpedo. There is just a possibility that means may be devised to do away with the bubbles. If so the torpedo will become far more dangerous than it is.

In order that a torpedo may travel at a fixed depth below the surface of the water it is provided with horizontal rudders. As the air escapes the torpedo becomes lighter and tends to rise, but in any case it would not remain long at any depth unless compelled to do so. If the depth becomes at any moment different from the fixed depth, the change in the pressure of the water causes movement of mechanism which actuates the rudders and brings the torpedo back to the fixed depth. This depth is decided on before the torpedo is fired and it is then "set" for that depth by means of a screw. If a torpedo was at or near the surface when it struck a ship, the effect of the explosion would be greatly lessened because of the absence of the weight of water above it.

There is inside the torpedo a gyroscope (art. 1) which corrects any deviation to the right or left and brings the instrument back to its proper direction. But the torpedo is not an instrument of precision. Except at short range it is very liable to miss its mark.

The fore end of the torpedo contains a heavy charge of explosive. When the head of the torpedo strikes a solid object, whether squarely or obliquely, a striker comes into play and detonates a small charge which explodes the main charge. In case, however, of too oblique a blow or of some defect in the torpedo the main charge may fail to explode.

The torpedo, like the gun, has increased in size, range, and power. At first the torpedo was considered to be a defensive weapon. The earlier kinds had only a short range. The introduction of the gyroscope and the use of heated air have enormously increased the range and it is now four or five miles. The latest torpedoes have a length of over 20 feet, a diameter of 24 inches and travel at a speed of over 25 knots. The weight of the explosive charge carried is 625 lbs. Even the usual 21-inch torpedo tears a huge hole in any armour. The head of a torpedo can be provided with an instrument for cutting through the steel netting which is sometimes used to stop it.

When fired from the deck of a destroyer or torpedo boat, the torpedo tube can be pointed so as to fire in any direction. The torpedo when fired drops into the water. On a big ship the positions of the tubes are fixed — generally so as to fire abeam, but sometimes ahead or astern — and the tubes are generally "submerged", that is, below the water line. The torpedo is thus kept in a safer place than if on deck. The accuracy of fire is also improved because of the absence of any shock or disturbance such as occurs when a torpedo falls into the water. There are valves in the ship's side. A valve cannot be opened except when a tube is in position against it. The torpedo is placed in position through a door in the end of the tube. This door cannot be opened except when the valve is shut. The torpedo cannot be

fired until the valve is open. There is also run out from the ship's side, just forward of the valve, a long bar or "spoon" which takes the rush of the water caused by the motion of the ship, and prevents the torpedo from being dragged aside, jammed or damaged.

The striker which explodes the charge in a torpedo cannot work until after the torpedo has travelled a short distance. This is a precaution against its charge exploding owing to its striking any object while it is near enough to injure the ship which sent it off or any other vessel near it.

As the air is used up the speed of the torpedo gradually diminishes and at last it comes to rest. It then, in order that it may not be a danger to shipping, automatically takes in water through a valve and sinks.

Torpedoes are also carried by aircraft which come down low to drop them.

During the war, German torpedoes fired from submarines were found floating about with the valves jammed so that they would not sink, and thus forming permanently floating mines, a procedure directly at variance with international law.

Art. 4. Mines. A mine is a receptacle, more or less cylindrical, containing a heavy charge of explosive, usually wet gun-cotton, and is intended to destroy a ship. The most common kind is the anchored mine. It is buoyant and therefore tends to float, but is held down by a wire rope and a weight or "sinker", so that it remains at a certain height above the bottom of the sea.

Most anchored mines are "mechanical contact mines". The usual kind is provided with a number of "horns" which project upwards and outwards so that any ship striking the mine must strike at least one horn, and that is sufficient to cause the explosion of the mine.

In other kinds there is an electric battery or other ingenious device and all that is necessary for an explosion is that the mine be tilted by the blow of a ship. The mines are anchored so as to be generally 10 or 15 feet below the water but the depth will vary with the state of the tide, unless use is made of the depth-controlling mechanism mentioned below. When a number of mines are laid in any area that area is known as a "minefield". The mines may be laid in rows, the spaces in one row being opposite the mines of the next. The moorings of mines become corroded in time and the mines then break adrift. It is a rule of international law that anchored mines shall be so constructed that a mine which breaks away from its moorings becomes harmless.

Another kind of anchored mine is connected by wire with an electric battery ashore and is fired by sending an electric current through the wire. This is known as an "observation mine". Mines of this kind are used near the shore, especially in connection with harbours, and are fired by an observer who can discriminate between an enemy ship and another. Observation mines are generally laid in rows and are so deeply submerged that no ship will touch them. For the latter reason the charge in the mine is specially heavy. The observer can, by means of buoys or by sextant observations, judge when the ship is near enough to a mine. Sometimes the mine rests on the bottom, when it is known as a "ground mine".

One variety of observation mine — now little used — is known as an "electric contact mine". In order that it may explode it must be touched by a ship and at the same time an electric current must be passing through a cable to the mine from a station on shore. The observer at the station can switch the current on or off.

A special kind of anchored mine, instead of remaining at a fixed depth, keeps moving up and down between certain limits. When it reaches the lower limit the pressure of the water actuates a device which causes it to rise. On reaching the upper limit the device ceases to operate and the weight of the mine causes it to go down. This kind of mine may be used for preventing the passage of submarines. The German Admiral Scheer states that in the estuary of the Elbe the British used, against German ships, a mine which goes up the estuary with the flowing tide but does not return with the ebb. It goes farther up when the tide again flows.

"Drifting Mines" which float on the surface and are not anchored are also used in naval warfare. When a ship is being chased by another it may throw such mines overboard. But international law provides that such mines shall be so constructed as to become harmless within an hour "after the person who laid them has ceased to control them."

Anchored mechanical contact mines were used in vast numbers in the war. The mines are generally laid by ships specially fitted as "mine-layers". The mines are laid from the stern and there are various systems of laying them. The clearing away of the mines or "mine sweeping" can be effected in various ways. The immense numbers laid in the North Sea were generally removed by two trawlers steaming on parallel courses. A long wire rope which is weighted extends from ship to ship and catches against the mooring chain of the mine, which can then be brought to the surface and exploded by rifle shots or by the gun of a destroyer. Any mines seen on the surface can be similarly exploded. The crews of the trawlers are accustomed to dealing with nets which are dragged along the bottom of the sea. The trawlers are of light draught, but one some-

times struck a mine and was destroyed. The work is hazardous in the extreme, and the results achieved were no less magnificent than the qualities of the men who carried out the work.

During the war the practice of mine-laying by submarines was introduced by Germany, and it was extensively adopted by her. A submarine can follow the mine-sweepers and, unseen by any one, lay mines afresh.

For counter-mining, that is clearing away enemy mines by means of mines, an electrically steered steam vessel can be made to tow barges laden with mines which are dropped automatically so as to destroy enemy mines and open a passage for ships. Buoys are also dropped to mark the cleared passage.

A "depth charge" is a special kind of mine. When it reaches a certain depth below the surface of the water the pressure of the water actuates mechanism which causes the charge to explode. It can be "set" to explode at any given depth. The depth charge is effective against submarines.

The paravane. When a boy runs along with a kite — properly slung — even when the air is still, the kite remains up in the air and travels along parallel to the ground, and some distance behind the boy. On the same principle an "otter" — consisting of a board on edge weighted with a leaden keel — is made to travel parallel to a boat, and several fishing lines can be attached to the line which connects it with the boat. The otter is somewhat astern of the point on the boat where the line is attached. The paravane is a development of this principle. Two torpedo-shaped otters — submerged and carrying depth-controlling mechanism — are attached, one on either side of a ship, by means of wire ropes, to a submerged structure projecting in front of the bow. The otters travel astern of this projection

so that the wires are at an angle. When either of these wires strikes the mooring wire of a mine it forces it away from the ship. The mooring wire travels along the paravane wire till it reaches a kind of jaw on the paravane. It is then severed. The sinker may be dragged along. It may be lifted but if so it sinks when the wire parts. The mine comes to the surface where it can be seen and destroyed. The invention of the paravane has enabled countless ships to traverse enemy minefields, destroy vast numbers of mines and save innumerable lives and cargoes.

In the explosive paravane used against submarines the otters — which are perhaps 200 feet apart — are at great depths and carry charges of explosives, which can be fired either by contact or by electric currents sent through the wires. These are attached to the stern of the vessel.

It is satisfactory to note that those who invented and developed the paravane, Commander Burney and Captain Usborne — they had to overcome enormous practical difficulties and great opposition — have been rewarded.

Art. 5. Miscellaneous. The part played in naval operations by wireless telegraphy is, of course, of enormous importance. A ship can speak to others which are far away in the invisible spaces of the seas. The transmission of messages is effected by what are supposed to be waves. A complete wireless instalment has a "transmitter" and a "receiver". A wireless installation on land has a far greater power of reception than that on a ship. The receiver of a wireless installation can be "tuned" to many degrees of fineness. It can be made sensitive either to a certain definite wave-length — this is called "sharp tuning" — or to a wide range of wave-lengths. If the operator at a station wishes to

listen for any signals which may be about, he adjusts his receiver so that the tuning is not sharp. When he hears a station on a certain wave he tunes his instrument to be sensitive to that wave-length only. He can take in the messages of friend or foe, and understand them if not in cypher. The night range for wireless is often several times as much as the day range. Both are subject to wide variations from day to day. A great night range often follows a cloudy day.

Wireless messages from the Admiralty are usually repeated from one of the big wireless stations such as Cleethorpes and can then be taken in by a ship — say in the Mediterranean or off the West coast of Africa. Such a ship can repeat the message and so it can reach even the Falklands.

At a fully equipped wireless station the direction from which a signal comes can be ascertained. If the signal is taken in simultaneously by two stations far apart, the point where the two direction lines meet gives the position from which the signals come. Great Britain made use of this principle during the war and established direction-finding stations which were of great use. The signals of enemy ships — including submarines — were heard, their positions ascertained and their movements followed. The Germans, on the other hand, conveyed much important information from Tuckerton station in America by a code which was dependent on a certain method of "spacing".

When an operator wishes to "jam" the wireless of another in his vicinity, he adjusts his transmitter to the wave-length of the other, and tries to shout him down. When in August 1914, the Goeben and the Breslau, steaming at full speed across the Mediterranean with the light cruiser Gloucester pluckily following them, shaped their course for the Dardanelles, they

jammed the wireless of the Gloucester. The two enemy ships had just escaped from Messina (Chap. VI. art. 2) an escape fraught with tremendous consequences, for the Turks thought the Goeben invincible, and without her might not have joined in the war. Wireless is used by aircraft. There is now wireless telephony as well as telegraphy. By means of "directional wireless" a ship or an airship or an aeroplane can ascertain its position. Two fully equipped stations must take in her signals. The result is achieved more quickly if the vessel is equipped with a wireless direction finder.

Wireless is not interfered with by fog. If a vessel has the necessary equipment she can tell the direction from which the signals of another vessel are coming and this is of immense importance in a fog. She can also to a great extent shut out jamming signals and also the effects of atmospheric disturbances. There is now at Farnborough a very big wireless station which can converse with aircraft in any part of the world. There is a still more powerful station at Saint-Assise near Paris.

Mr. Filson Young in his book "With the Battle Cruisers" gives an account of a visit to the wireless room of a battleship in the North Sea when it was a "wonderful night for wireless". He heard the deep voice of the Cornish station at Poldhu, the bell-like tones of the Eiffel Tower in Paris, the loud — because close at hand — voice of the British Naval Commander-in-Chief, the voices of the far-away Russian and German Commanders-in-Chief, and the powerful and clear tones of the German Nordeich station giving its untruthful recital to the world.

For signalling to another ship or to the shore, there are several systems. There is the semaphore, the signalman extending his arms in different positions gener-

ally with a flag in each hand; and the mechanical semaphore which is visible for several miles. Signals are are also given by means of flags and pendants; letters, numerals, words or short sentences being transmitted, and the interpretation being effected by reference to books. In this way an Admiral frequently sends up a signal to all his ships, each "hoist" remaining up until all have taken it in. Again there is the International Code by means of which short sentences can be transmitted without either ship knowing the language of the other. Thus, "Do you surrender?" was asked by the Cornwall when the Leipzig was burning and had ceased firing her guns. At night, signalling in the British Navy is effected by flashing with a light which is alternately shown and hidden for long or short periods, the system being similar, to the Morse system of dots and dashes. If the distance is great, a searchlight or other powerful electric light is used. Foreign navies usually adopt some system of coloured lights. In a fog, signals are made by fog-horns, sirens, whistling, and sometimes by guns. The system of signalling in the United States differs from that in the British Navy. When the United States ships came across to help in the war, their signallers promptly learnt the British system.

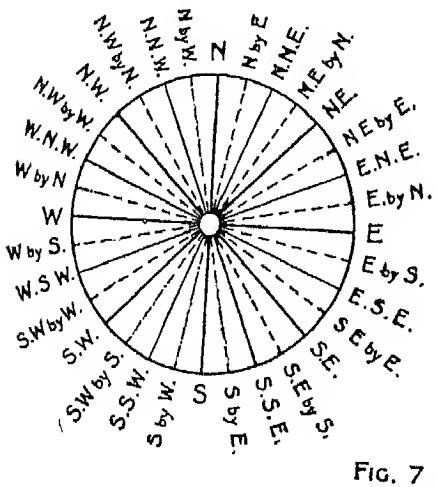


FIG. 7

The compass (Fig. 7) has 32 points. When a ship

turns at a right angle to her previous course she turns eight points. The four cardinal points of the compass are each shown by a single letter, and the four intermediate points each by two letters. The next set of eight intermediate points are each shown by three letters and thinner lines and their designations are derived from the two-letter points. Thus adjoining N. E. there is a N. N. E. and an E. N. E., the one half-way to the North and the other half-way to the East. Finally there are sixteen points whose directions are shown by dotted lines. The two nearest N. are N. by E. and N. by W., the two nearest N.E. are N.E. by N. and N.E. by E.

Compasses are used not only in ships and submarines but in aircraft. The magnetic north differs from the true north by an amount which differs in different parts of the world. On charts both are shown.

CHAPTER III.

SHIPS OF WAR [1].

Art. 1. Ships of war in general. The big ship of war of to-day is a mass of machinery. She is divided into compartments with water-tight doors. On her upper deck are big guns and below it are torpedoes. She may have a ram, her stem being raked backwards and the most advanced part of it being under water and of heavy steel. Though sails have been long since abandoned she still has her mainmast and foremast [2], but they carry the "fire control stations" and "spotting tops" not, as in the case of the old three-decker, the top-gallant masts and "royals", brave old names recalling stories of the sea!

The compartments with water-tight doors are of course made with the object of preventing water which, in the case of damage to the ship, may enter one compartment from getting into the others. In recent large ships great attention has been paid to this matter. Battleships twenty years old which were struck by mine or torpedo, in the Dardanelles operations and elsewhere, could not be saved. In some cases where there was merely a single longitudinal bulkhead this, by preventing the water from spreading, caused the ship to capsize. More recent ships have survived under-

[1] The descriptions given in this Chapter apply to ships of war in general. Special points affecting British ships are duly mentioned.

[2] In the older British battle cruisers there are tripod masts. Also in the large monitors. The battleships of the Iron Duke class are single-masted. In the U. S. Navy the masts are made of steel lattice work.

water injuries, at least when caused by torpedoes, and have been brought into port and repaired. The war, however, has shown that further improved means of defence against under-water attack is required.

From the "conning tower" — the tower is heavily armoured and is situated in the forward part of the ship — telephones radiate and directions are given as to course, speed, or fighting. From the adjacent "bridge" a much better view can be obtained, but it is unprotected. The fire control station is in communication, by telephone or speaking tube, with all the guns. The operations of fire control are complicated. The aiming of each gun is done by a "gun-layer". The advantages of firing salvoes, that is of simultaneous discharges of all the guns which will bear, have already been mentioned. Also the method of finding the range. The ship, and also the enemy ship, may be constantly altering speed and course. Petty officers keep observing the range and the bearing of the enemy ship.

Sea battles, as already remarked, are often fought at long ranges. If a gun-layer can see his target and if he is given the range, the sights of the gun can be adjusted to suit the range. The necessary change in the elevation of the gun of course follows when the sights are brought onto the target. But very frequently the gunlayer — he is at a lower level than the fire-control officers — cannot see the target. The petty officers who observe the ranges and bearings keep telephoning them down to the transmitting station whence the necessary instructions, in terms of "opening" and "closing" ranges, are sent back. But the gun and its platform are moving with the rolling and other movements of the ship. There is nothing steady from which the elevation and direction can be measured. Many of the details of fire control are confidential. There are different systems

in different ships and navies. It is well known that a gyroscope (Chap. II art. 1). forms part of some of the arrangements. The "Director" system invented by Sir Percy Scott has been largely adopted in the British Navy.

"Barrage fire" can be adopted very much as on land. It can be used if a small vessel is approaching or running away and is adopting a zigzag course. All guns which can be brought to bear, fire so that the projectiles, as they fall, cover a line through which the vessel must pass.

In the British Navy the Royal Marines man a few of the guns on battleships, battle cruisers and a few light cruisers. A gunnery officer of the Royal Navy is always in charge of all the guns.

The "main armament" of big guns is for use at long ranges, the "secondary armament" of smaller guns for use at moderate ranges, and there are also the small quick-firers for use against small craft at short ranges. Some of these last were, in the older ships, mounted in the tops. The big guns are on the highest deck, the secondary guns mostly on the main deck, which is the next to the upper deck. The magazines for ammunition are situated deep down in the ship. The usual positions of the torpedo tubes have been already mentioned Their number is 2, 4, 6 or 8.

Photographs of the following ships appear below, the years noted being the years of completion.

Battleship, Iron Duke, 25,000 tons, 1914.

Battleship, Revenge, 25,750 tons, 1916.

Battle Cruiser, Queen Mary, 27,000 tons, 1916.

Light Cruiser, Cairo, 4,190 tons, 1919.

Light Cruiser, Birkenhead, 5,250 tons, 1915.

Flotilla leader, Valhalla, 1,330 tons, 1917.

The smaller ships include destroyers, torpedo boats, gunboats, submarines and some monitors. They are not

armoured, and only some of them are divided into compartments. Torpedo boats and destroyers are similar to one another in character, but the latter are larger and can keep the sea and have almost superseded the former. Both carry torpedoes and guns; both are narrow and very fast, and can turn and manoeuvre quickly. A submarine may be bigger or smaller than a destroyer. She carries similar weapons, but is not nearly so fast even when on the surface. The destroyer can often ram a submarine and is, in any case, her most dangerous enemy. A "flotilla" — generally numbering twelve to twenty — of destroyers or submarines has a "depot ship" — perhaps an old cruiser carrying a few 6-inch or 4-inch guns — where stores can be obtained and defects made good. There are also fleet repair ships. Gunboats and monitors are not fast, and usually carry one or two guns, those of a gunboat being heavier than those of a destroyer, and those of a big monitor being as heavy as those of a cruiser or battleship.

The "radius of action" or "fuel endurance" of a ship — the distance which she can steam without taking in a fresh supply of fuel — depends on her fuel-carrying capacity. It is greatest for big ships. The endurance of any particular ship is greater the slower the speed at which she travels. In covering a given distance any ship burns less fuel the greater the time occupied.

The "displacement" of a ship of war is the weight, in tons, of the water which she displaces when afloat. This is the same as the gross weight of the vessel. She is supposed to be fully equipped and to be carrying her normal fuel supply. The displacements of ships of war as given by different writers do not always agree exactly. Sometimes the figures are officially revised. There is no need for excessive refinement in quoting the figures.

It is, of course, impossible to prepare a table, like a

table of weights or measures, stating, for instance, that so many destroyers are equal to one cruiser, or so many cruisers equal to a battleship. Therefore, in order to compare the strengths of two or more fleets or navies, battleships must be compared with battleships, cruisers with cruisers, and so on. It is further necessary to separate the old battleships from the recent.

Comparisons of fleets can only be made by considering the displacements. If the guns of two ships — whether belonging to the same country or not — are not alike in number and calibre, it is impossible to give figures comparing the gun-powers. It is not possible to compare even the total weights of shot fired per minute, because the rate at which the guns can be fired is not known exactly. And it is wholly impossible to compare the gun-power of a ship with her speed or with her armour. The old plan of comparing the displacements is the only practicable one. It may be taken that a fair proportion of the weight of the ship consists of guns, armour, engines — which decide the speed — and fuel which decides the endurance.

The tables in Chapters VI. art. 1, and VII. art. 1 show the ships of the great naval Powers. The ships shown are those used for fighting and borne — or recently borne — on the regular lists.

Regarding the functions of ships of war, battleships are meant to fight, cruisers to scout and to protect trade or to attack enemy trade. Smaller craft also do these things, though they chiefly do escort and patrol work, hunt submarines and take part in blockade operations and in the examination of merchant ships. Actually a warship of any kind has various functions. When describing the most usual operations of war, (Chap. V. art. 4) the kinds of ship which generally take part in each of them will be mentioned. In Chapters V. and VI. many

instances of what ships have actually done in time of war will be found.

Great ship of wars are frequently built in batches. Lord Fisher objected to this, stating that while the batch is building there is no improvement. His motto was:

"Build few and build fast
Each one better than the last."

Not very long ago the engines of all ships, whether ships of war or others, were of the "reciprocating" kind, with cylinders, pistons and cranks, the kind whose steady trampling, heard day and night, is — or was — familiar to travellers by sea. These engines are now being fast displaced by "turbine" engines, in which the rushing high-pressure steam, acting on the blades of a turbine, gives a "direct drive" to a shaft, which is usually "geared down" to drive the more slowly moving shaft of the screw propeller. Boilers of the old kind are being displaced by those called "water-tube", the water being heated in tubes round which the fire burns. This improvement is due mainly to Lord Fisher. With water-tube boilers steam can be got up more quickly than with the old kind. The "small-tube" boiler is a further important improvement. It occupies less space and is lighter. It has been used in the latest big British ships, Hood, Glorious, and Courageous.

Oil fuel is to a large extent displacing coal which requires a great number of stokers and a longer time to get up steam, gives far more trouble in "coaling" whether in port or at sea, and also gives rise to sooty deposits in the boiler flues. A ship which burns oil has, *ceteris paribus*, an advantage as regards speed especially when the power has to be kept up over a long period. The British battleships of the Royal Sovereign class,

completed in 1915 and 1916, though originally built for burning coal, were converted to burn oil. A ship which burns oil is cleaner than one which burns coal. All destroyers in the British Navy burn oil and have turbine engines.

In the manufacture of the guns, armour and engines of a ship of war, extraordinary care is used. In fact, the construction of every part of the ship receives very close attention. Besides the engines for driving the ship there are numerous other machines and appliances. There are, of course, pumps, machines for steering and for manipulating the guns and torpedoes; winches and hoists for handling stores and ammunition.

Art. 2. Speed, guns and armour. In every ship of war whether large or small, speed is of great importance. Superior speed enables a ship or a squadron of ships to choose the time and place for fighting, to choose the range, to come up in time to assist others, to overtake or escape from an enemy or to out-manœuvre him. Speed is also extremely necessary in order to avoid or attack submarines. In the case of a squadron the speed depends on that of its slowest ship. Published figures of speed are not reliable. Sometimes they are only designed speeds, sometimes the results of actual trials. The trial speed generally exceeds the designed speed. But the speed capacity of a particular ship is by no means the same at all times. It is reduced when she is covered with barnacles, or when sooty deposits have occurred in her boiler flues. When she is cleaned her speed is increased again. By strenuous stoking extra speed can often be got out of a ship. The speed of a ship also depends on the load she is carrying. With a normal coal supply the speed is greater than when the bunkers are filled up. The speed of a ship falls off when her engines become old.

The speed of a ship is expressed in "knots". A ship travelling at the rate of ten nautical miles an hour is said to be doing "ten knots". It is not correct to say "ten knots an hour". The speed used to be tested by throwing overboard a log to which was attached a cord having knots at intervals. The number of knots which ran out in a given time gave the speed of the ship. A knot is really a speed and not a distance, though it is sometimes used loosely to mean a nautical mile.

A "nautical mile" is 2,027 yards, or almost exactly 15 per cent. more than the statute mile of 1,760 yards. Sixty nautical miles make one degree of latitude. Distances at sea, especially when gunfire is being mentioned, are often given in yards. When given — in despatches or other naval statements — in miles, these must be understood to be nautical miles. A rough rule for conversion of thousands of yards into nautical miles is to divide by 2. To convert statute miles into thousands of yards, multiply by $1\frac{3}{4}$. Thus 4 miles, 8 miles, 12 miles, are, respectively, about 7,000, 14,000, and 21,000 yards.

There was for a long time a struggle between the big gun of the battleship and the armour. In spite of the fact that iron for armour has given place to toughened steel — with a face of extreme hardness — a few inches of which are as good as a foot of iron, the big gun has won in the contest. An armour-piercing projectile from a 12-inch gun can, even at a long range, penetrate thick armour if it hits it squarely. Under the same conditions, a 15-inch projectile will penetrate the thickest armour and at a very short range it can penetrate armour far thicker than any in use. At a very short range an armour-piercing projectile from a 6-inch gun will penetrate thick armour. But at long ranges — and most battles are fought at long ranges, one side at least having an interest in keeping the range long — it is

much easier to hit the ship than to hit the thickly armoured parts of it, and the projectile most used is common shell because it does far more damage than any other, as already mentioned. It has nothing like the penetrating qualities of the armour-piercing shell. At moderate ranges the thick armour keeps out the shells of the secondary guns.

There has sometimes been a tendency to regard the big gun as the sole important factor in a battleship, and to relegate the other items to the background. No doubt the big gun is by far the most important factor. Without it a battleship would be nearly useless. But armour is the next most important item. Without thick armour a battleship would be in jeopardy except at the longest ranges. Speed is also of great importance, as has been seen. So, under many circumstances, is fuel endurance. Torpedoes and secondary armament come last.

Art. 3. Sizes of ships of war. A battleship of a given displacement can carry a certain weight of big guns. In many cases this weight is about one-thirtieth of the displacement of the ship. Generally the weight of all the guns — main and secondary armaments — with their mountings and ammunition, is 16 to 18 per cent of the ship's displacement. Consider two battleships, *A* and *B*, each of 20,000 tons, and each carrying ten 12-inch guns and having main armour 11 inches thick, and speeds of 20 knots. This description applies with fair accuracy to many ships built some fourteen years ago. The thick armour of *A* can, as has just been seen, be pierced under certain conditions by the guns of *B*. *A*'s best defence against *B* is to fire at her with her own guns. In neither ship can increase in the thickness of her armour be effected, except by reducing either the area protected or the weight of her guns, or by sinking her deeper in the water and sacrificing speed and free-board. *A* may reduce

the number of her guns and increase their size and so be able to increase the accuracy of fire at long ranges and the effectiveness of each shot, but if the number of guns is too small and the weight of each gun too great considerations of the ship's stability and strength come in. As long as ships were of about 20,000 tons, the 12-inch gun was the one used. In order to gain an advantage over *B* the plan for the country which owns *A* is to build a bigger ship. It is a law of the resistance of ships to motion through water that, among ships of the same shape, the bigger the ship the higher the speed at which she can be driven without encountering excessive resistance and needing disproportionate engine power.

Everyone knows that a rowing boat if towed by a ship (or a toy-boat by a rowing boat) will raise a great wave and perhaps be submerged. She is going at a speed disproportionate to her size. As between *A* and *B* the bigger ship gains somewhat in speed. She can also carry a greater thickness of armour. She can carry an increased weight of guns, their calibre being as before or greater. The latter is the plan most in favour. If *A* carries eight 15-inch guns, and *B* twelve 12-inch guns weighing about the same, the total weight of projectiles which can be fired per minute at a long range by *A* and *B* respectively, may not differ very much and the ranges may not differ much. *A* will fire a certain number of projectiles weighing, say, 1,950 lbs. each, and *B* a far greater number of projectiles weighing, say 850 lbs. each. The advantages of the bigger gun have just been mentioned. The ships, which succeeded those of 20,000 tons, were mostly of about 24,000 tons with armour 12 inches thick and ten 13.5-inch guns. Later came ships of, say, 26,000 to 32,000 tons with 13-inch or 14-inch armour and 14-inch or 15-inch guns.

In building the bigger ship, in order to gain speed,

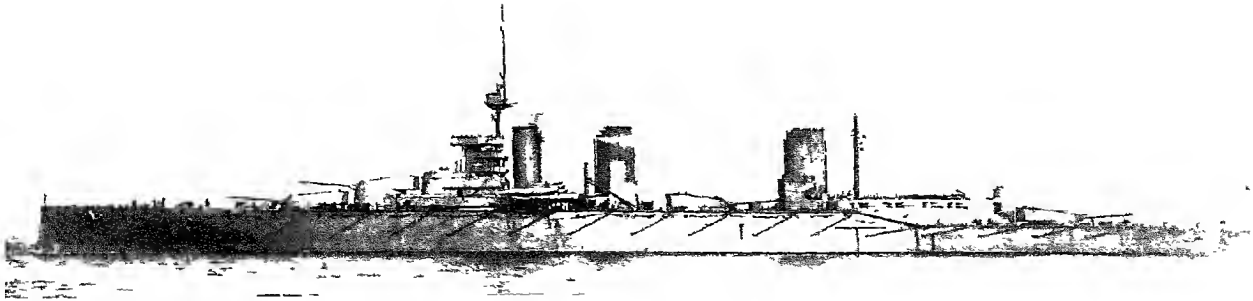
it is assumed above that the shape remains as before. It is, however, sufficient if the length and beam (breadth) are increased in the same proportion. The draught need not be, and is not usually, much increased. The extra size may also be got chiefly by increasing the length. This gives "finer lines", but increase of beam is necessary if much increase of stability is desired.

The above remarks contain rough average facts and figures. In details there are variations, one point or another receiving preference in a particular class of ship. Special attention may for instance be given to speed, the weight of the engines being increased at the expense perhaps of fuel capacity.

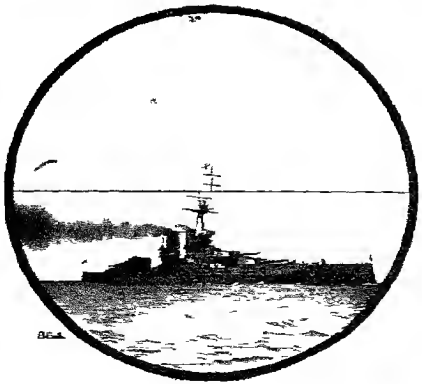
In another class speed is sacrificed somewhat. The German battleships generally had thicker armour than others, at least in parts, and some of them had rather less speed. They were generally of greater beam than the British ships and thus had greater stability. The British docks were not wide enough. The ships had to be built to suit the docks. This defect was removed during the war.

This increase in the sizes of battleships has not much connection with the question of gun versus armour. As the weight of guns is increased, so is that of armour. If the ships *A* and *B* are both bigger than before, the guns of *A* can still pierce the armour of *B* under the same sort of conditions as before. But either *A* or *B* has a great advantage over a smaller ship. The increase in size of battleships still tends to continue. The latest battleships — Japanese — are of nearly 34,000 tons with 16-inch guns.

Cruisers have lighter guns and thinner armour than battleships, but similar considerations applied, and for some time they increased in size. But for cruisers number is required and this necessitates their being compar-

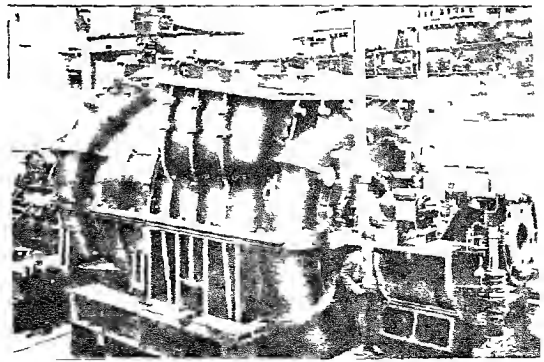


Battle Cruiser QUEEN MARY Built by Palmer's Shipbuilding & Iron Co Hebburn-on Tyne



Battleship
IRON
DUKE

Fig 3



VICKERS
LIMITED
Turbine for
a Warship
Constructed
at Barrow-
in-Furnes-

atively small. Many such have been built. British light cruisers are generally some two knots faster than German or ex-German ships of similar class.

A battle cruiser has thinner armour than a battleship of the same size, but has greater speed. As regards size the same considerations apply as to battleships. Battle cruisers have increased in size.

Destroyers and submarines have also increased in size, the chief object being to secure greater speed, more powerful armament and greater radius of action. Bigger torpedoes are being made and more of them are carried.

Ships of war are now built with finer lines than formerly, that is they are less tub-shaped. In pre-Dreadnought battleships the ratio of the length to the beam used to be about 5.1 to 6, in post-Dreadnoughts it was at first about 5.5 to 6 25. More recently it has been about 5.9 to 6.7, being generally somewhat low in the case of Germany (5.9 to 6.3) and high in the case of Great Britain (6.5 to 6.7). In battle cruisers the ratio is 7 to 8.4, being highest in the British Renown and Repulse. In light cruisers the ratio is 8 to 10.4, in destroyers 10 or 11. In big ships the draught averages roughly about a third of the beam. It is generally less in proportion to the beam, in the newer and bigger ships than in the older and smaller ones of the same kind. And it has been seen that the ratio of the beam to the length has been generally decreasing. The draught increases very slightly as the ship becomes bigger. No ship has a draught of more than about 29 feet.

Art. 4. Recent Developments. Besides submarines, which are separately dealt with below, the war has seen the design of some entirely new types of warships and considerable development in aircraft.

During the Dardanelles operations, some sailors bathing

from a cruiser anchored in deep water, seemed to observers at a distance to be walking on something solid beneath the water. They were standing on a belt which ran along the ship's side and had been added to make her proof against torpedoes. The cruiser was the Edgar, of 7,350 tons, and others of her class and of other classes were altered in the same way. The belt or "bulge" projected some 10 feet from the side of the ship. It was invented by Sir Eustace d'Eyncourt recently Chief Constructor of the Navy. It supersedes the torpedo netting mentioned below, and has been used in many ships. There have been various modifications in the design. No ship having a bulge was lost in the war. The ships became known as "blister ships". They were used for attacks on forts or on enemy land forces. Any other ship kept stationary or nearly so would, if in deep water, be in imminent danger from submarine attack.

The introduction of the bulge has given rise to a discussion on ship construction. When the side of a ship is damaged by a torpedo or the like, one or more compartments on that side of the ship are flooded. The chief danger is the capsizing of the ship. The greater the beam of the ship, the greater — other things being equal — is the stability and the less the danger of capsizing. In large ships — the Queen Elizabeth for instance built just before the war and designed by Sir Philip Watts — there are, inside the outer skin and parallel to it, three or four longitudinal bulkheads. The outer skin has the usual "ship-shape" form. In the cases of some ships which had not been built with such bulkheads, the bulge was added during the war by Sir Eustace D'Eyncourt. The bulge contained parallel longitudinal bulkheads. The bulged part of the ship became practically similar to the corresponding portion of the

Queen Elizabeth. And it was the part where a torpedo would strike. The bulge also gave increased width and stability. The idea was excellent. The addition of the bulge was, of course, easier than if the whole side of the ship up to deck level had been bulged. In designing the new ship Hood, Sir Eustace D'Eyncourt again arranged for the bulge. In the discussion above referred to, it is contended that it would have been better to adopt the Queen Elizabeth arrangement and to have had a proper ship-shape hull.

The matter is, no doubt, complicated by some details, but the main points are fairly simple. The stability of a ship — say the Queen Elizabeth — at any moment depends partly on the lowness of her centre of gravity, but more on her width at the waterline. Suppose that her sides are shifted inwards, so that her width is reduced from the deck level to a level a little above the waterline, the bulge thus starting from this latter level and its top sloping downwards and outwards. The bulges are now the only part of the ship having anti-torpedo protection. Her above-water capacity is reduced, and with it her weight and cost. Her engine space is unaltered. Her speed would be increased — by reason of reduced draught — but for the added "skin friction" due to the submerged part of the top of the bulge. When she has a list — say to port — such that the higher part of the top of that bulge is a few feet under water, a torpedo slightly submerged can strike her above the port bulge. This seems to be her one defect, due to a saving in cost. To change the ship back to the Queen Elizabeth type, while keeping her cost the same, it would be necessary to reduce her width below water and increase it above water. She would have finer lines, greater speed and less stability. In short, the bulged type of ship has more stability than the ordinary type and is somewhat more vulnerable.

Other new types of ship evolved during the war are the larger monitors and the aircraft carriers.

In war time the regular cruisers are supplemented by "auxiliary cruisers", which are merchant ships — generally large and fast liners, which had been previously ear-marked for the purpose — "converted" into cruisers by being supplied with guns. They are, of course, unarmoured.

For laying or sweeping up mines, the vessels ordinarily kept in a navy may be old cruisers or gunboats, and not very numerous. In the war many hundreds of steam trawlers and drifters were employed, for mine sweeping and patrolling, by Great Britain. A trawler drags her net at the bottom of the sea. A drifter has her nets at a fixed depth below the surface. Great Britain, as the chief carrier of the world's trade, owned about two-fifths of the merchant shipping of the world. She had and has by far the greatest number of fishermen. This enabled her in the war to employ great numbers of ships as "fleet auxiliaries".

For use as despatch vessels, and for patrolling, hunting and attacking submarines and their bases, some small steam yachts were, early in the war, taken over from private owners and small guns put on board; and great numbers of fast motor-boats were manufactured.

Transports, whether for troops or horses, are ordinary merchant ships taken over for the work and fitted up. There are also ships used for carrying coal, oil, munitions, stores or water. In all the above cases the ships become for the time being warships. Whether armed or not, they are liable to be sunk by the enemy. Hospital ships also are merchant ships fitted up for this special purpose.

An electrically controlled motor-boat — an old device with new features — was used during the war by the

Germans. The fore part of the boat contains a big charge of high explosive. The boat is intended to ram an enemy ship and its movements are controlled from the shore by means of wire cables which it pays out as it travels. The crew after starting the boat, leave it. An aeroplane watches its course and signals to those on shore when and how its course is to be altered. Three such boats were sunk by the British and one was wrecked by running into a pier. Nelson's "fire-ships" were revived, large floats, aflame with petrol, having been sent down the river Piave to burn the bridges held by the Austrians.

An innovation adopted in the new United States battleships, and reported to be satisfactory, is the electric drive. Ordinarily in a turbine ship there is a separate turbine for going astern. It is desirable to have turbines running at a very high speed. In the electric drive system a high speed turbine generates electric current and this current is led through cables to a slow-speed electric motor which is fixed to a short propeller-shaft. The turbine always runs at top speed, while the speed of the propeller is altered by controlling the current which passes into the motor. If desired, the current-controller can be put on the bridge, so that the officer can drive the ship dead slow, half-speed or full-speed, ahead or astern, by merely moving a handle. There are four propellers and it is claimed that the whole arrangement is less vulnerable than the usual one. All four must be put out of action before the ship is crippled. A possible source of trouble in a battle is the switches being put out of action by exploding shells.

Internal combustion engines have lately come into use on merchant ships. They admit of a great increase in cargo and need no stokers. At present they are less reliable than steam engines and there is some doubt

whether the supply of oil will always be sufficient. Ships have also been built with their plates electrically welded instead of being riveted.

For some special war-time types of ships not mentioned above see art. 6.

Aircraft. These are used for scouting, for escorting ships of all kinds, for raids, for fighting enemy aircraft with machine guns, for direction of gunfire, for destruction of mines and for attacking ships, especially submarines, by means of bombs.

Bombs — explosive or incendiary — are simply dropped in most cases, but shells are also shot out, at a low velocity compared with that of a projectile from an ordinary gun, from a tube. Aircraft cannot stand the heavy recoil which would result from a shell fired at a high velocity. Torpedo-carrying aircraft come down very low and drop their torpedoes into the sea. The torpedo is propelled through the water like any other torpedo. German bombs, of elongated form and dropped endwise, were sometimes wrongly described as "aerial torpedoes".

Aircraft carriers have a high free-board and a great expanse of deck. The speeds vary from 21 to 31 knots. The deck is not interfered with by funnels or other things, and disturbance of the air by gases from the ships' fires is avoided, the gases being passed out at the stern. Aircraft can perch on the tops of the turrets of very big ships or on the revolving platforms which are provided for them on some of the latest light cruisers. Aeroplanes flying off from these positions can come down on the deck of an aircraft carrier.

The aircraft hangars are on the lower decks. Thence the aeroplanes are lifted to the flying-off deck by elevators. On American aircraft carriers there are "catapult" devices for starting the aeroplanes.

Aircraft carriers are necessary because of the small radius of action of aeroplanes. But airships can be built with a great radius of action. An airship can carry several aeroplanes and send them off while herself keeping out of range of enemy guns.

The conditions which are unfavourable to the use of aircraft are bad weather, fog and darkness. Of the heavier-than-air types the ordinary aeroplane has, of course, several varieties. There are fast fighters and big bomb-carriers. The latter is the less agile and has much more endurance. Constant changes and improvements are made. Experiment and research have been continuous. Excellent work has been done at the National Physical Laboratory. Engines have become far more reliable and the machines are far better able to stand bad weather. An air-cooled engine is in use and it will give increased safety. Speeds of over 200 miles an hour have been attained. Scouting aeroplanes can go up to 20,000 feet. Further research and experiments continue. An altitude of 40,000 feet has been attained by an American airman. A silencer of light weight has been tried. This will facilitate the picking up of information sent by wireless telephone. An "amphibious" machine — one which can take off from, or come down on either land or water has been constructed and used. In its case a large aerodrome is not necessary; rivers in the heart of a town can be utilised. Precautions against fire have been improved upon and also aids to night flying. New schools have been opened for intensive flying training. Technical training can be obtained at the universities and colleges.

When the wheels — used for landing — are replaced by pontoons the aeroplane becomes the seaplane. In the boat-seaplane or flying boat the pontoons are replaced by a single boat. Such boats were built in England

during the war. A large boat can remain on the surface, even in heavy weather.

Regarding lighter-than-air types of aircraft, an airship by using "directional wireless' can find her position even in a change of wind, and fog troubles her less than it does surface craft. When a mooring mast is provided she can sail in any weather. There are also "kite" — that is captive — balloons. These are often towed by patrolling or escorting craft, the object being generally to see long distances and to spot submarines in the water below them, the attacks on the latter being mostly left to the surface craft. The Germans considered a Zeppelin airship to be worth five light cruisers, for scouting purposes, though they failed at Jutland. An airship if filled with helium cannot be set on fire, and has extraordinarily long endurance.

The British airship, R. 38, which was lately destroyed, failed because of faulty design. This is somewhat apt to happen — as in the case of the bridge built some years ago over the river St. Lawrence — when anything much bigger than usual is attempted in engineering construction. Some web plates in the girder joints of the airship were found, by the Accidents Investigation Committee, to be soft, and this showed lack of proper supervision during the construction. This particular defect did not, probably, contribute to the accident, but it might have done so. The report of the Committee does not say who was responsible for the lack of supervision.

A large airship can attack a submarine by a wireless-controlled bomb from long range or drop a torpedo-carrying seaplane to attack from close range. She can hunt a submarine by using the hydrophone. As long as the submarine is kept down and her locality is roughly known, she is harmless.

Aircraft can, of course, be attacked by anti-aircraft guns (Chap. II. art. 2) or by other aircraft. An aeroplane or seaplane, in order to attack an airship, gets above it if possible. The track of a torpedo is visible from the air. A submarine commander knows that if he launches a torpedo he reveals his position to aircraft. In consequence of this, aircraft were quite extensively employed as escorts in the war, and an escorted vessel was seldom attacked. For bombing work on escort duty, an airship is better than an aeroplane, because she has longer endurance and can cruise more slowly but she is not so quick in getting over the torpedo track and bombing it. In the war there was one known instance of an airship sinking a submarine. Other aircraft destroyed some eleven submarines, seriously damaged twenty-one and hit twenty more.

Aircraft bombarded many Allied ships operating on the Belgian coast in the war, but hit only one. The decks of ships are at present vulnerable to attack from heavy bombs dropped by aircraft. Armour can be added, but it would necessitate a corresponding reduction in weight somewhere on the ship. Recent experiments with bombs dropped from aeroplanes on ex-German ships have been made in the United States. A submarine, a destroyer, a cruiser — the Frankfort — and the battleship Ostfriesland — post-Dreadnought — were sunk. The attacks lasted for several hours. The heights of the aeroplanes varied from 1,000 to 4,000 feet, being least for the submarine and greatest for the big ships. The submarine was hit only once and sank. The destroyer was hit twice but several bombs fell close to her. The battleship was hit by three 1,000-lb. bombs and was sunk by 2,000-lb. bombs which fell close to her. Dummy bombs were dropped on the battleship ex-Iowa, which steamed at 3 to 9½ knots, but hardly any of the bombs

fell on the ship or close to her. It is clear from the experiments that a large bomb exploding close to a battleship has the same effect as a mine. Thus the target area is really bigger than the actual ship.

The damage done by the bombs which struck the ships was found — by the United States Joint Board on the experiments — to be such as to be "disastrous to exposed personnel, serious to light upper works, comparatively slight to heavy fittings such as guns and negligible to turrets."

The main difficulty in all cases is that of obtaining hits. The Board remarks that the experiments were not conducted under battle conditions. The targets were practically stationary, the visibility and flying conditions excellent, and the aircraft were not being fired at. In other conditions the percentage of hits would, no doubt, have been much lower.

Further experiments were made by the British Naval authorities in the summer of 1922. The pre-Dreadnought battleship Agamemnon was used as a target. She steamed at 10 knots and was controlled by wireless from a destroyer. Aeroplanes dropped more than 200 bombs from a height of 8,000 feet. The hits obtained were about 3 per cent. At close range, about 50 bombs were dropped and nearly all hit the ship. Again of course the experiments were not made under war conditions, and of the hits obtained only a very small proportion were serious.

Art. 5. The greater ships (Details). *Battleships.* It has already been remarked that the sizes of battleships have gradually been increasing. The ships launched in the dozen years preceding 1906 were mostly of 12,000 14,000 or 16,000 tons. In 1906 came the Dreadnought of about 18,000 tons and then ships of about 20,000, 25,000, 28,000, 32,000 and 34,000 tons, the last two being in the navies of the United States and Japan re-

spectively. The lengths have increased from about 380 feet to about 700 feet, and the speeds, formerly 18 or 19 knots, have become as a general rule 21 or 22 knots though some of the ships have speeds of 23 to 25 knots. Some still larger ships were designed or under construction, but are to be scrapped or construction cancelled (Chap. VII. art. 1).

In battleships launched before 1906 and now existing — or existing when the war began — the main armament nearly always consists of four guns, generally 12-inch, but sometimes of other sizes varying from 13 inches to 9.4 inches. The guns of the secondary armament vary in size from 9.4 inches to 6 inches or occasionally 4.7 inches. The guns of the main armament are mounted in barbettes (defined below) in pairs, one pair firing ahead and one pair astern but capable of firing also on the broadside. None of these ships now remain in the British Navy as fighting ships, but there are still some in other navies and in any case it is necessary to consider them because they took part in the war. They are known as "pre-Dreadnoughts".

In the Dreadnought, built by Great Britain and launched in 1906, the secondary armament was abolished. She was an "all-big-gun ship", and carried ten 12-inch guns. There was now only one kind of gun ammunition — excluding quick firers — to be kept on board, less complication in fire control and greater accuracy of fire. The big guns were still mounted in pairs and mostly in the centre line of the ship.

But the increased range of the torpedo made it necessary for a battleship to be able to attack torpedo craft at distances of several miles. Hence in the battleships which succeeded the Dreadnought — called in this work "recent battleships" or "post-Dreadnoughts" — the secondary armament again appeared. In the British

Navy it was a 4-inch and later a 6-inch gun. The main armament continued to be 10 or 12 big guns. Small quick-firers continued to be carried. This system prevails in all great navies, the only modification being that when the calibre of the big gun is increased to 15 or 16 inches the number carried is eight.

The big guns of a battleship used once to be mounted in "turrets", a turret being a circular armoured tower which could revolve. The armour extended overhead and the gun projected through an opening in the side of the turret. This kind of turret has long been superseded by the "barbette", which is also circular and armoured but does not revolve, and is open at the top. In recent battleships it is more than 40 feet in diameter. The guns are mounted on a turn-table near the top of the barbette and fire over the top. At first they were protected only by a hood, but now they are surrounded on all sides as well as overhead by armour which revolves with the turn-table, the gun projecting through an opening as before. The structure overhangs the barbette at the side next the breech of the gun. It is now again called a turret. The barbette extends downwards into the ship, and up a shaft in its centre is brought the ammunition. The guns can be loaded in whatever direction they are pointing and whatever their angle of elevation or depression may be, instead of having, as formerly, to be brought to one particular angle. The training of the guns both horizontally and vertically is effected by machinery, but can be done by hand if emergency arises. Hydraulic or electric power is used for this machinery as well as for the "travellers" by which the ammunition is brought along horizontally from the magazines and for the lifts by which it is brought up the shafts.

In some post-Dreadnought battleships, three of the

turrets are in the central line of the ship, and two "wing" turrets near the middle of the ship are abreast of one another. Thus in firing a broadside the guns of four turrets can be used. In still later battleships, two adjacent turrets on the central lines are "superfiring", that is, the bow or stern turret is lower than the one next to it which can fire over it. This arrangement is clearly seen in the accompanying illustration of the battleship Revenge. There are generally two guns in a turret, sometimes three. The guns are always side by side and fire in the same direction. The total number of turrets in a battleship of recent date is four, five or six. There are nearly always two superfiring pairs. There may also be one turret in the centre line or two wing turrets placed diagonally. In all the above cases all the guns can be used on either broadside. Two turrets can fire ahead and two astern. If there are turrets placed diagonally they can fire ahead or astern. More guns, but not so many as on a broadside, can be used for firing at any other angle. Occasionally there is only one pair of superfiring turrets, one turret in the centre line and two diagonal. In the most recent ships there are only four turrets (superfiring) and eight guns.

The guns of the secondary armament in existing battleships, whether pre-Dreadnought or recent, are generally mounted in "casemates" — this term denoting a chamber surrounded and roofed over by armour — or are otherwise protected. Some of the guns can fire on one broadside or the other, some ahead and some astern, and all have a certain range of angle fire so that every point of the compass is commanded by some of them. In a few of the older ships the bigger secondary guns are in turrets, but in most of them the secondary guns are on the main deck and the firing is liable to be interfered with by splashes of water.

For the protection of the engines and boilers, which are vital parts of a ship, there is a belt of thick armour, generally 14 to 18 feet wide, mostly above the water-line but partly below it, and running along both sides of the ship. In the older existing ships the belt extends over about half the length of the ship and the ends of the belt are connected by thickly armoured bulkheads which run across the ship so as to form with the belts an armoured chamber. The side of the ship above the belt generally has armour which is thinner. It may be about two-thirds of the thickness of the belt armour. The armoured chamber stands on the lower deck. This is plated with thin armour which can stop shell splinters. Over it is the main deck. The conning tower and the barbettes and turrets for the big guns have armour which is generally of a thickness differing not very much from that of the belt. It may be thicker. The armour for protecting the secondary guns is thinner. In continuation of the main belt there is generally some thinner armour extending towards the bow and stern. Of recent years the length of the main belt has been increased, in proportion to the length of the ship, the armour ahead and astern of it has been increased in width and thickness, being generally reduced gradually and reaching a minimum thickness at the bow of the ship and a lower minimum at the stern. The main deck over the chamber also has armour, its thickness being, say one-fourth or one-fifth of that of the main belt. One or both of the armoured bulkheads are omitted. In the most recent battleships the thickness of the belt armour is 11 to 14 inches. In older existing battleships it is generally 6 to 11 inches, but in a few special cases among the oldest ships some 16-inch armour was used, the belt being very narrow.

Before the introduction of the bulge, battleships were

provided with steel netting for protection against torpedoes. The series of inclined booms seen along her side are used for holding the nets out. The nets are mostly used when the ship is stationary and even then they are not a sure protection. The nets do not reach to the bow and are no protection against mines.

It was decided, long ago, that the pre-Dreadnought battleships are not fit to take a place in the line of battle. They can, however, do excellent work on their own account. They must be considered as a separate kind of ship. In the war some were used for battering the Turkish forts on the Dardanelles, some as escorts to troopships, some — whose guns had been transferred to monitors — were used as transports and one as an ice-breaker in the White Sea.

A "coast defence ship" is a battleship of low speed. Such ships are still used in a few countries but generally a more mobile ship is preferred.

Cruisers. Cruisers are of more than one kind and of many sizes. First there are the old armoured cruisers. The largest of these have displacements of about 15,000 tons and lengths of some 490 feet, the smallest have less than half the above displacement. An armoured cruiser is like one of the older battleships but has, supposing the size to be the same, greater speed, lighter guns, and thinner armour. The arrangement of the armour is similar. The remarks in the preceding paragraphs regarding the provision of barbettes and turrets for the main armament, and the arrangements for the secondary armament, apply to them. None of them have super-firing turrets. The heaviest guns — there are generally four — in the main armament are 10-inch, 8-inch or 7.5-inch. In the secondary armament the sizes are generally from 7.5 to 6 inches. Other old cruisers have no barbettes, the guns of the main arma-

ment being more numerous and placed in casemates. The speeds of all these cruisers vary from 18 to 26 knots, the faster ships being generally among the largest. They are being rapidly superseded by battle cruisers. Only a few are still on the lists, only one in the Navy of Great Britain.

The cruisers now in general use are the "light cruisers" with displacements varying from 3,200 to 9,750 tons. Most are of 3,750 to 5,500 tons. Nearly all are new or fairly new. Only the German ships and a few others are old. They generally have no armour or only deck or belt armour of a thickness ranging up to 4 inches. There are no barbettes or turrets. The guns carried are generally 6-inch but may be 5-inch, 5.5-inch, or 7.5.-inch. The speeds of light cruisers vary from 20 knots to 36 knots. The number of torpedo tubes varies and may be as great as 12.

In the United States Navy most of the light cruisers are called "scout cruisers". The latest, building since the war and 10 in number, are of 7,500 tons and have designed speeds of 33.7 knots. Only eight of the twelve 6-inch guns can be fired on either broadside. In the Japanese Navy the latest light cruisers are of 5,500 tons with seven 5.5-inch guns, and have designed speeds of 36 knots. The latest light cruisers built by Great Britain have generally 6-inch guns and a 3-inch armour belt. The designed speeds are generally 29 knots, but in some cases are 25, and in some 32 knots. Some of the ships have the bulge and are well adapted for foreign service and commerce protection. The vessels of the Raleigh [1] class have a modified bulge and are of 9,750 tons, carry seven 7.5.-inch guns, have four propel-

[1] Raleigh lost by grounding off Labrador coast, August 1922. There are 2 ships of her class and 2 building.

ler shafts and no bulges, and the engine-room and boiler room are divided longitudinally by bulkheads.

Battle Cruisers. A few years ago, the existing armoured cruisers being considered by the British Admiralty to be not very suitable, a larger type with greater speed and heavier guns, was evolved by Lord Fisher, and ten of them were built. He called them, on the spur of the moment, the "New Testament Ships" because they fulfilled the promise of the "Old Testament Ships". The weight of guns of even one of the smallest of these ships is equal to that of many a battleship and they were judged to be fit to take station, under proper conditions, with battleships in the fighting line. The name "battle cruiser" was given to them. A battle cruiser is like one of the recent or post-Dreadnought battleships. The arrangement of the armour is similar. The turrets are similar. A battle cruiser has lighter armour than a battleship of the same size, but greater speed. When Great Britain began to build battle cruisers Germany quickly followed suit. Russia and Japan followed suit and increased the size of the ships. Until recently the displacements of battle cruisers varied from 17,000 to 32,000 tons, the lengths from 560 to 750 feet, the biggest ships being the uncompleted ones of Russia. The big guns — 6 or 8 in number — were 12-inch, 13.5-inch or 14-inch. There were three or four turrets and in most of the ships one or two pairs were superfiring. The secondary guns varied in calibre from 4 to 6 inches, the thickness of the armour belt from 7 inches to 12 inches, this last thickness occurring only in three German ships. The designed speeds were 25 to 28 knots, though the British Tiger has attained something like 30 knots. The Hood of 41,000 tons, built by Great Britain during the war, is the most

recent and by far the most powerful battle cruiser. Her length is 810 feet. With her 12-inch belt she represents an attempt to combine a battleship and battle cruiser. The belt is 562 feet long and 9.5 feet wide. She has the bulge, and it extends over the full length of engines and magazines. Her eight 15-inch guns have a maximum elevation of 30° and she burns oil.

It has been mentioned that gun-power is the great essential in a battleship and speed in a light cruiser. In a battle cruiser both are essential. Possessing them both she is a ship of enormous value, and very great credit is due to Lord Fisher for his design of her. A cruiser can play havoc with destroyers. A battle cruiser can play havoc with cruisers. She can overhaul and destroy them. She did so at the battle of the Falklands. But in a line of battle she must be used with discretion as her armour is not of the thickest. Remarks regarding the losses of battle cruisers are given in the article on the battle of Jutland (Chap. VI. art. 6).

Two British ships, the Glorious and Courageous, are very similar as regards size, speed and armament to battle cruisers, but have only four guns apiece and no better armour than light cruisers. They were at first classed as light cruisers, but should really form a class of their own. Lord Fisher got the Treasury to agree to his building as many "light cruisers" as he wished. He at once ordered these two — of 18,600 tons each. They have a comparatively light draught so as to be able to chase and destroy an enemy in fairly shallow waters. The Courageous is fitted as a mine layer.

Monitors. A monitor is a broad vessel of shallow draught which carries a heavy gun or two. Her speed is not great. Monitors were first used for work in rivers. During the war much larger ones were built and were

used for sea fighting. Owing to their small draught they are fairly safe against torpedo attack and they can go into shallow water. The displacements varied from 1,250 to 8,000 tons. The larger vessels had 2 guns, in a central turret, of 12 to 15 inches calibre or — in one case — one gun of 18 inches. Some had been intended for Norway as coast defence ships. The guns have high elevations. (See also Chap. II. art. 2). The biggest monitors have a tripod mast which carries the spotting top. They also have the anti-torpedo "bulge". The monitors were used for attacks on enemy land forces and for bombarding harbours and other works, notably in Belgium and Italy.

Art. 6. Smaller Ships. *Torpedo craft.* The first of these to be built were torpedo boats. They were of small size and were intended to sink big warships. Then followed the "torpedo boat destroyer" which is now termed simply a "destroyer". She is a long, low craft but the forward part has a higher free-board than the rest. As she races through the water she throws up a large white bow wave. She was at first intended to destroy torpedo boats, and she sometimes does so, but generally torpedo boats and destroyers are both used for the same general purpose. Destroyers vary in displacement from 340 to 1,350 tons, in length from 200 to 320 feet. The speed varies from 25 to 36 knots or more. One British destroyer at least built during the war attained a speed of over 39 knots. Some destroyers can lay mines. Torpedo boats have displacements varying from 60 to 300 tons, lengths from 60 to 205 feet, and speeds from 18 to 27 knots. The smallest destroyers have two torpedo tubes, one 9-pounder gun and six 3-pounders. The largest have six or twelve torpedo tubes, four 4-inch or 4.7-inch guns an anti-aircraft gun and some smaller or machine guns. Torpedo boats have usually 3 tor-

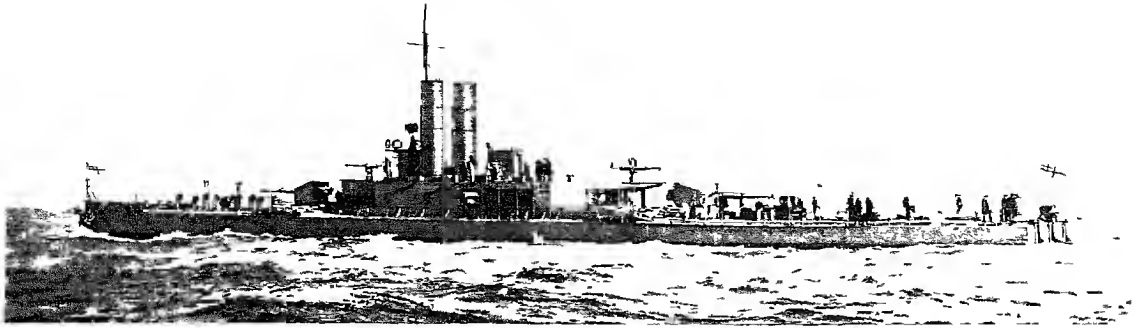
pedo tubes, occasionally 2. The torpedoes are fired from the deck. An "ocean-going" destroyer — the larger kind — can face heavy weather and may have a radius of action of 1,000 miles. The gun has become its chief weapon. A "flotilla leader" is a large and powerful destroyer, generally of 1,350 to 1,800 tons.

Sloops and Patrol Boats. Over a hundred sloops — unarmoured vessels of about 1,250 tons — were built during the war by Great Britain for minesweeping and convoy work. Some dozens of patrol boats were also built during the war. The displacement was about 600 tons, the speed 22 knots. The guns carried were one or two of 4.7 inches. Some patrol gunboats — or "Kil-boats", their names all beginning with Kil — were also built. Bow and stern were alike.

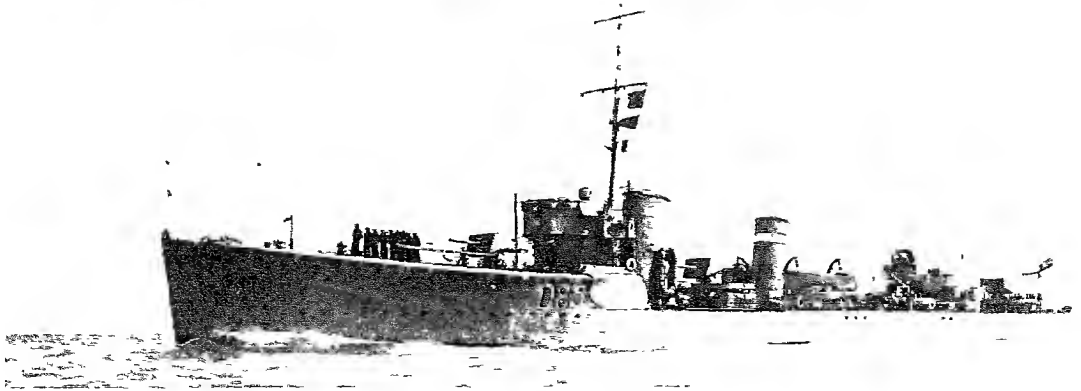
Gunboats and Despatch Vessels. Seagoing gunboats were constructed chiefly in order to destroy torpedo boats, but they had not sufficient speed — they are not fast boats — and were superseded by the destroyer. There used to be some of about 1,000 or 1,200 tons, with 2 guns of 4.7 inches. Turkey had a few of similar size which were called torpedo cruisers and had each two or three torpedo tubes. There are still a few gunboats of similar displacement, but most are much smaller and intended for use in rivers. The displacements are from 320 to 620 tons, the armament consisting of 1 or 2 guns, 3.9-inch to 4.7-inch.

Despatch vessels are generally of 550 to 680 tons and carry 2 guns of 5.5 inches.

In order to police the Tigris, during the campaign in Mesopotamia, 16 river gunboats of shallow draught were ordered by Lord Fisher from Messrs Yarrow & Co. In order that red tape delays might be avoided, Messrs



Gunboat
Built by
Yarrow & Co
Glasgow



Destroyer
D 85
Built by
Yarrow & Co
Glasgow

Yarrow & Co. were entrusted with the design of the boats.

Submarine Hunters. Among the new types of vessels constructed during the war there were several which were used chiefly for hunting and attacking submarines. The "coastal motor boat" has a maximum length of 70 feet (maximum displacement about 27 tons), a speed which may be 38 knots and carries a torpedo which is discharged, tail first, over the stern, the boat going ahead fast and getting out of the way of the torpedo. Some of these boats can lay mines. The draught is small and the boat moves on the water rather than through it, the bows high in the air, and the stern low down in a smother of spray. She goes safely over a minefield or the torpedo of a submarine. Her speed and small size make her a difficult target for a gun.

The hydro-glider, not yet used in naval work, is propelled by a screw which revolves in the air like that of an aeroplane. When going at full speed — her speed is great — she draws only a few inches of water.

A "chaser" is 70 to 100 feet long — with twin screws and reversible 6-cylinder petrol engines — capable of rapid turning and manoeuvring. Her speed is about 20 knots. She carries small guns, depth charges and sometimes a small torpedo. Another type of anti-submarine vessel constructed during the war was the American "Eagle" built at the Ford works. She is a big edition of a motor launch and has many of the characteristics of a destroyer of the early type.

Art. 7. Submarines. A crude form of submarine was used in the American Civil War of 1861—64. In the Russo-Japanese war of 1904 the Japanese further developed the matter, using some boats which ran just below the surface, two pipes projecting above water being used for the

intake of air and the expulsion of steam. Submarines of the modern type began to come into regular use about the year 1900. Some of the early ones had lengths of 60 to 100 feet with submerged displacements of about 60 to 200 tons, and speeds of 8 to 10 knots on the surface and 5 or 6 knots when submerged. Their radius of action was only a few hundred miles. By the year 1915 there were British submarines 180 feet long with submerged displacement of 800 tons, speed of 15 knots on the surface and 10 knots submerged, and radius of action, at low speeds, of 5,000 miles. There are now much larger vessels.

On the deck of a submarine is a conning tower which has a hatch. From the conning tower project vertically one or two periscopes. These contain prisms and anyone looking into the tube can see out as if looking horizontally. On the deck there is a gun or guns. There are masts for wireless. In most cases the chief means of attack is by torpedoes. Wires running from end to end of the vessel and passing over the conning-tower afford a protection against nets, mines and hawsers. These wires can be used as an auxiliary aerial so that the submarine can wireless without putting up a mast and be ready to dive immediately in case of danger.

A submarine has twin-screw propellers. When on the surface she may be driven by steam but is usually driven by Diesel oil engines. These have superseded the ordinary petrol engine. They require no arrangements for producing an electric spark. Any kind of oil engine is impracticable when the boat is submerged because of the gases escaping from the exhaust. A steam engine is also impracticable. When submerged a submarine is driven by electric motors, the electricity being obtained from storage batteries or "accumulators". The electricity is also used for lighting. The batteries are charged

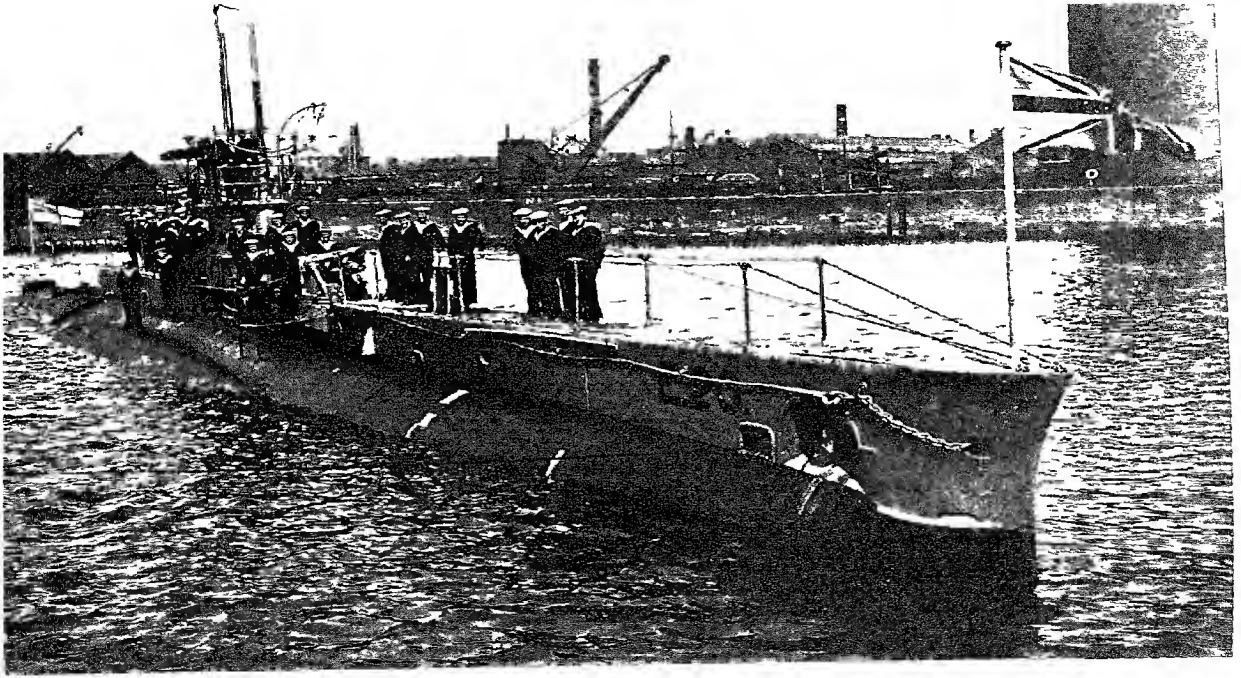
afresh by an electric motor generator driven by the engines when the vessel is running on the surface. There are always the two sets of engines and the storage batteries are extremely heavy in proportion to the power they develope.

There are many varieties of submarine. A torpedo is made with a blunt, rounded head and a gradually tapering after-end. A submarine tapers gradually at both ends. A blunt head would cause much "wave-making resistance" when the vessel was running on the surface. A submarine is built so as to be able to withstand the pressure of the water at a depth of 150 or 200 feet. Owing to the great weight of the engines and motors the hull, which is of steel, cannot be made very heavy. In the early vessels the hull was more or less cylindrical in form. Other things being equal, a submerged vessel offers better resistance to being crushed by the pressure of the water, and also less resistance to movement through the water, the nearer her cross-section approaches to the form of a circle. This form is not a good one for stability, though stability depends a good deal on the distribution of the weight carried. In later vessels a double hull was introduced and this adds greatly to the strength. The space between the inner and outer hulls is utilised for water tanks. The ratio of length to greatest width in a submarine was at first about 5 but has increased to 10 or more. Owing to the tapering ends the mean width is much less than the greatest width and this of course affects the stability.

A submarine carries stores of highly compressed air, which is used for breathing when the vessel is submerged — the vitiated air being pumped out — and also for other purposes mentioned below. The stock is renewed when the vessel is on the surface, the com-

pression being done by an air compressor driven by the engines. The torpedo tubes vary in number and position. There are always 2 or 4 at the bow. There may — except in the smaller vessels — be an equal number of broadside tubes and perhaps one at the stern. The number of torpedoes carried is 1½ or 2 per tube. The torpedoes are introduced by means of a special hatch or hatches. When a torpedo is fired an equal weight of water enters the tube and remains there. The gun when not in use is stowed away in a chamber below the deck.

A submarine is provided with capacious water-tanks. By the admission or ejection of water she can alter her weight to compensate for fuel consumed or taken on board. By the same means she can disappear below the surface, sink to any required depth, adjust her trim and remain at a given depth with her engines stopped, but this requires care, water having to be admitted to, or ejected from one tank or another in order to maintain the trim and the depth. Usually a submarine performs the above operations by means of her diving planes or "hydroplanes" which act like rudders so long as she has any forward movement. She admits enough water to the tanks to bring her decks "awash" — her conning tower being still exposed — and then "dives", i. e. deflects her course downwards by the action of the planes until she has descended to the depth desired. By means of the planes she can easily maintain her depth and trim, so long as she moves forward. Her behaviour may be affected by changes in the specific gravity of the water, as when fresh water is met with at the mouth of a river. A submarine can lie on the bottom of the sea with her engines stopped. She can rise to the surface in a few minutes by expelling water from her tanks. This is done by admitting compressed air to them or by pumping. When a submarine rises to the surface by simple



SUBMARINE E 20. Built by Vickers, Barrow-in-Furness

flotation, the periscope does not make a track of foam on the surface as it does when she rises by means of her planes. Before rising to the surface it is necessary to listen for the sound of propellers, and a "blind moment" occurs when the submarine is visible but has not risen high enough to enable her to obtain a view herself. Diving and rising to the surface are best done when broadside on to the waves. In the early days a submarine used to dive head first to get below water; and some stuck their noses in the mud and never came up again, and in the shallow waters of the North Sea this limited the dimensions of the vessel. One reason why submarines were so troublesome in the Irish Sea during the war is that the depth is such that they can lie on the bottom and wait. The same is true of the sea near Heligoland.

The time required for a submarine to dive and disappear depends on her type and size and on the state of the sea. It takes a few minutes if she is running on the surface fully exposed and using her oil engines. If she is running with deck awash, with masts, ventilators, etc., cleared away and using her electric motors, it may be a very rapid affair. As far as possible a submarine runs with her hatch open to secure fresh air. She cannot safely run on the surface in very rough weather. When somewhat below the surface in rough weather she suffers from "pumping", that is being constantly thrown up and down. The electric engines can drive the boat for several hours and she can remain submerged for a long time.

The radius of action of a submarine is limited by her fuel capacity but she may be able to obtain supplies from a ship or from a secret base on shore instead of returning to her regular base.

The view obtained in clear weather by means of the

periscope of a submarine may extend for several miles. The altiscope is mentioned below (Chap. VI. art. 5). The torpedo is usually fired when only the periscope is showing. Successful firing requires much skill. The torpedo tubes are fixed and the submarine has to be manoeuvred into the correct position for firing. Much better practice can be made when the submarine is on the surface, or at least has her conning tower exposed. A submarine may, however, have torpedo tubes on deck, as in the case of a destroyer, so that the torpedo can be discharged in any direction. The tubes are "disappearing" that is, they can be stowed away in recesses in the deck before the submarine submerges. They can only be used when her deck is above water.

As regards the sizes of submarines, the smaller sizes are more handy and can submerge more quickly and in shallower water. There is also less difficulty in manoeuvring to take aim with the torpedoes. When possible the submarine fires at the broadside of a ship. To hit a ship in any other position is difficult. Regarding attacks on convoys see Chap. VI. art. 5. A submarine can sink a merchant ship by firing shells at her or she may capture her and destroy her by bombs or by setting on fire. A merchant ship when in danger from a submarine steers a zigzag course, the zigzags being irregular. She may hide herself by means of "smoke-boxes" which emit great volumes of smoke and are carried on the stern or are dropped overboard and burn while in the water. At night "darkening ship" is most necessary.

The look-out on the merchant ship attacked has been found to be all-important. If she sees the periscope before she is attacked the chances of escape are distinctly in her favour; otherwise they are against her. In the war rewards were given to the man who first sighted

a submarine. The British government ordered that four men, specially trained as look-outs, were to be carried on each merchant ship of over 2,500 tons. When an unarmed merchant ship was attacked about one in four got away. When a merchant ship was armed and showed fight, about three out of four escaped, either sinking the enemy ship or driving her off.

Low visibility and calm sea are the conditions least favourable to the submarine. Before sunrise and after sunset the vessel nearest the sun may be at a great disadvantage because she — or her periscope — is clearly shown up against the sky. When the sun is above the horizon but low down, the vessel nearest the sun has the advantage. The speed of a merchant ship which is attacked is of vital importance. Figures recently published show that of ships which were travelling at 5 knots, all which were attacked were sunk, of those doing 12 knots half were sunk, and of those which attained 18 knots only a tenth were sunk.

The great point in favour of a submarine is her elusiveness. She can lie in wait or cruise slowly with her decks awash and can then dive, if under weigh, very quickly. Her hull is often painted in splashes and irregular patterns to make her less visible. German submarines operating in the North Sea had their hulls painted a dirty grey colour, with the decks black, and the colours — blending with the tints of the water — were difficult to see. The great point against the submarine is that she must run on the surface in order to charge her electric motors. At night she is generally on the surface but she can generally see before being seen. In daylight she is usually submerged, bringing up her periscope for brief periods.

Accidents to submarines are of course somewhat common. Many have dived and never re-appeared. A sub-

marine is liable to be lost by collision or grounding. In shallow water cases have occurred of a submarine sinking owing to some accident or defect and being subsequently raised and towed to harbour. The German U-boats were each provided with a buoy containing a water-tight telephone. If the U-boat sank, the buoy could be released and would rise to the surface. Anyone finding and opening it could converse with those in the U-boat.

On many occasions two submarines have fought each other one or both being sunk. In October 1918, the British submarine E. 10 after torpedoing the German destroyer S. 33 in the North Sea, was sunk by the gunfire of the destroyer. Both vessels sank and there were no survivors.

Some submarines are fitted as mine-layers. The mines are stowed one above another in a compartment and are discharged through the bottom of the vessel.

In the "Voyage of the Deutschland" the commander of that big submarine tells how, while in the Gulf Stream in July, the temperature inside the submarine was 127½° Fah. and how, when he submerged in Chesapeake Bay at a spot where the depth was charted as 17 fathoms, the Deutschland went down till the gauge showed 27½ fathoms, the needle of the gyrocompass jumped about erratically and the pumps would not work. He had submerged in a deep hole, the ship for some reason spun round and the valves of the pumps became temporarily choked with mud. He describes the din in the vessel when the order for submerging has been given, the hissing of the air as it rushes out of the tanks and all the high notes of the machinery combining to produce a "mad, diabolical music". He recounts how a destroyer was sighted while the submarine had her bows on to a heavy sea, how she tried to dive while in that position,

failed at first and then plunged so suddenly that her bow stuck in the mud for a while. He got home safely and was greeted by his merchant friends. Perhaps he said to them with the Psalmist, "I have kept me from the ways of the destroyer".

Art. 8. Special types of submarine. A submarine with great radius of action is often called a "submersible cruiser" especially if she carries a big gun. Of the German submersible cruisers built during the war the largest had a surface displacement of about, 2,150 tons — submerged 3,000 tons — a surface speed of 18.5 knots and great radius of action. One submersible cruiser was sunk with all hands, on 11th. May 1918, by a British submarine off Cape St. Vincent. The Deutschland type — converted mercantile submarines — had a surface displacement of 1,850 tons

Of the submarines built by Great Britain during the war those of the K class have special characteristics. They were intended to take part in general battles and are able to cruise with a fleet, the speed when on the surface being 24 knots. They are 338 feet long with beam of 29.5 feet, draught 16 feet and 8 torpedo tubes of which 4 are on the beam. The displacement is 1,880 tons on the surface and 2,550 tons when submerged. This may be somewhere about the practical limit of size. They have great radius of action but no great capacity for long submergence or for speed when submerged. When on the surface they are steam-driven and burn oil and have geared turbine engines. There is also a Diesel engine for use just before diving or just after breaking surface. The mechanism is complicated. When on the surface they are practically destroyers. The guns are, however, nearer the water than those of a destroyer.

Lord Fisher in his "Reminiscences" reports that in 1915 he proposed the construction of submarines, each

carrying a 12-inch gun. Some such were made during the war. They are the M class and are sometimes called submersible monitors.

The K. 13, when on her trials near Glasgow, sank in 70 feet of water. When she submerged, the engine room ventilators were left open though an order to close them had been given. Some 28 men in the engine room compartment were immediately drowned. About 50 men were in the control room and all the resources of the Glasgow building yard and of a salvage ship were applied to save them. In order to explain that men in the submarine were alive, Commander Greatheart — soon after the submergence of the submarine — tried to escape through the conning tower by the aid of compressed air released from the flasks, but he was caught against the roof of the chart house and drowned. Commander Herbert, who was with him, followed involuntarily, and came safe to the surface. A pipe to convey air to the control room was made and brought into use. A big pipe was made to enable the men to escape through it but it was decided that it would be quicker to lift the forward end of the vessel out of the water and cut a hole in the plates. This was done. The 6-inch hawser used for the lifting, parted just after all hands had been got out, and the vessel again lay on the bottom.

On 19th January 1921, the K. 5 was lost with all hands. She submerged during manoeuvres and never came up again. It has been suggested that she was overtrimmed in diving, that is took too steep a dive, and that this may have been due to her crew not being perfectly familiar with all details. A vessel of such weight diving steeply would descend to a great depth and be crushed by the pressure of the water. If the vessel is getting deep and the tanks to which compressed air is admitted are not quite full, the air has first to raise the

pressure in the empty portion of the tank. Until this is done and the water is driven out buoyancy is not regained. Another theory is that there was an internal explosion after the vessel dived.

Art. 9. Anti-submarine measures. The chief offensive weapon against submarines is the "depth charge". A depth charge is a mine which can be set so as to explode when it reaches a given depth under water (Chap. II. art. 4). Every British destroyer during the war was provided with a depth charge thrower. The oldest and simplest methods for destroying submarines were gunfire, ramming and torpedoing. Other methods, developed during the war, are nets, rows of mines, depth charges and bombs. Out of 94 cases of destruction of enemy submarines analysed ("The Navy", Dec. 1919) 28 were found to be by depth charges, 15 by ramming, 15 by British submarines — the weapon used in most cases being the torpedo — 14 by gunfire, 5 by bombs from seaplanes, 3 by nets, and 7 by the Q-boats which are mentioned below. A few were blown up by their crews or destroyed in combined operations or grounded in neutral territory and interned. The above shows no cases in which the destruction was attributed to mines. The list is very far from being exhaustive since the total number destroyed was about 200. As to destruction by aircraft see art. 4. After America entered the war the supply of mines was enormously increased and Lord Jellicoe, in "With The Grand Fleet", states that after that event the number of cases of destruction of submarines by mines was as great as that of destruction by depth charges.

Bombs dropped near a submarine may cause leaks or force down the diving planes causing the submarine to go down to a dangerous depth. Direct hits destroy her or at least prevent her from submerging. In the

muddy waters of the southern part of the North Sea, a submarine cannot be seen, even from aircraft, when it has submerged.

The heavy anti-submarine steel nets used were strongly anchored and in shallow water were arranged so as to stop the progress of the submarine but in other cases were arranged so as to deflect its course and cause it to come to the surface or — if the bottom was muddy — to dive to the bottom and stick there. Besides the heavy steel nets a system of light fishermen's nets was designed, the object being, not to catch the submarine, but to make it indicate its presence by setting floats in motion. The "Actaeon" anti-torpedo net is carried on a ship and is intended to divert a torpedo and cause is to miss the ship.

A very important device is the "hydrophone" or "listener". By means of it the sound of the propellers of a submarine can be heard at a great distance and a skilled listener can judge of the direction from which the sound comes. The aptitude of some men can be improved by training. "Listening" and "periscope" schools were established at more than one port during the war.

The scientific investigations of anti-submarine measures made during the war, were of immense extent and of great value. Experiments were made to determine the degree of explosive necessary to produce useful results at various distances and depths. A magnetic submarine detector was developed and is useful at close quarters. A system of invisible signalling — to be used between chasing ships when wireless telegraphy is not desirable — was invented. A submarine can, under some conditions, move almost without noise, and listening would not reveal her. A system of detection was invented which depends on the sending out of a beam of sound waves — analogous to a beam of light — and on the "echo

effect" produced when a submarine enters the beam. Submarines can now, more easily than formerly, be located, and compelled to fight,

The "camouflaging" or "dazzle painting" of ships makes it difficult for a submarine to judge of the course of the ship. Camouflaging was originated by Lieut-Commander Norman Wilkinson, a well-known painter, and was done on a great scale during the war. There were special schools for teaching it.

There was, during the war, an enormous amount of hunting and chasing of submarines by fast vessels — destroyers, coastal motor boats, chasers, eagles, motor launches, trawlers, drifters — some thousands being employed altogether. The boats not only fired on them while on the surface or rammed them if they had just submerged, but often dropped a depth charge at the spot where the submarine had disappeared. There is an idea that a submarine is generally sunk when rammed by a destroyer, but the blow may be a glancing one and many submarines have escaped. When a submarine on the surface is attacked by a seaplane, she has less time in which to dive than when attacked by a destroyer but organised hunting of submarines by aircraft was developed late in the war.

Then there were the "Q-boats," or "Mystery ships". In order to save torpedoes and to obtain loot, the German submarine commander — after perhaps firing one torpedo which might miss the ship or not damage it fatally — used to bring his craft to the surface within a few hundred yards of the ship and compel her crew to abandon ship and to send a boat to take off some of his men who, after looting the ship and placing bombs in it, were rowed back to the submarine.

When this custom became known, the British navy sent out a "tramp" which carried naval gunners and

concealed naval guns. When the ordinary crew or "panic party" had abandoned ship, the gunners and their officers lay concealed. On pressing a button, dummy deck-houses fell clattering down, the white ensign ran up, fire-gongs sounded and naval guns opened fire and sank the submarine. It was months before such an encounter occurred because the Q-boat had to go far out on the trade routes. It would never have done to play the game in home waters where another submarine might have been watching and reported it. Several submarines were thus destroyed but at last one managed to patch herself up and limp home with the news of how it was done.

After this the work became grim to a degree. The Q-boat instead of dodging an approaching torpedo, let herself be hit. On occasion she fired short — with her small exposed merchantman's gun — to lure on the submarine. After the panic crew had left the ship, the submarine continued to torpedo or shell her till satisfied that no one could be on board. Then she would approach and steam carefully round. When she came to the surface the gun crews, who had been lying face downward and motionless, had their turn. Marvellous are the accounts of their heroism. On one occasion their ship was on fire and the deck where they lay became red-hot. They clung to the mounting of the gun and held the shells in their arms. Eventually they and the gun were blown into the air, as they had anticipated, when the fire reached a magazine which was underneath them, but they all fell on the ship again. There was a V. C. for Commander Gordon Campbell and one for a member of the gun crew selected by ballot.

For some further remarks on anti-submarine measures see Chap. VI. art. 5.

CHAPTER IV.

THE LAW OF THE SEA.

Art. 1. General laws. The proceedings of warships and of merchant ships in time of war are in many ways regulated by what is, for convenience, called "International Law". The doubtful and unsatisfactory state of such law is well known, each country interpreting the "rules" in its own way and many disputes arising. A certain number of general principles are, however, more or less recognised.

The jurisdiction of any country extends out to sea as far as a line drawn at a distance of three nautical miles from the shore — at low water — of its territories. The waters within that line are known as "Territorial Waters". In the case of a bay between two headlands the limit is measured from a line drawn from one headland to the other but it has never been decided how big such a bay may be. Norway has always claimed that in her case the distance is four nautical miles and not three. Great Britain has never admitted the claim. Norway decided during the war to increase the distance to ten miles. Italy announced during the war that her limits had been extended to five miles. A Russian Soviet decree has recently prohibited foreign vessels from fishing within twelve miles of the coast in the White Sea. Great Britain refuses to agree to the prohibition beyond the three-mile limit.

"Contraband of war" so-called to distinguish it from customs contraband, but for shortness in dealing with

maritime law referred to simply as "contraband", is a term applied to certain classes of goods which, if conveyed by sea in a neutral ship to a belligerent, are liable to capture. Enemy property — ships or goods — met with at sea is liable to capture, as an inherent right of war. An enemy's coast or ports may be "blockaded", that is all ingress and egress by means of the sea cut off, no matter what goods are concerned. To entitle it to recognition by neutrals a blockade must be "effective". The above are ancient customs in maritime war. They have been gradually modified and there are now many subsidiary rules concerning them, as will be seen.

A merchant ship captured by a belligerent is known as a "prize". The reason for capture may be the nationality of the ship or the nature of the cargo, or part of it. By the custom of nations every prize, even if it has been destroyed, is adjudicated on by a "prize court" of the country which makes the capture. The same is done as regards the cargo, or any part of it which is "brought into" the prize court. The court administers international law as it is accepted by its own country. It can order "condemnation", which means confiscation, or release. It can award compensation for wrongful capture of a ship or goods.

A belligerent warship has the right to search any neutral merchant ship anywhere on the high seas. The primary object of search is to show whether the ship really belongs to the country whose flag she is flying, of what her cargo consists and what evidence there is of its ultimate destination. If, as is frequently the case, complete examination cannot be made at sea, the ship can be taken to port for further examination. This custom is as ancient as any. The ship may then be released or kept as "prize". It is generally assumed that an enemy merchant

ship may be sunk if she has attempted to escape, or has resisted search or failed to stop when ordered, or if it is impossible for her captor to take her into port. But he must provide for the safety of the ship's company who have become his prisoners. Those on board a neutral merchant ship, even if she is made a prize, are free from arrest. During the American Civil War two persons were taken by a United States war vessel from on board a British merchant ship. They were released on the demand of the British Government.

The practice of employing privateers — privately owned vessels — for capturing enemy merchant ships was abolished by the Declaration of Paris in 1856 as between the Signatory Powers. But as it is expressly provided that non-signatory Powers cannot claim its benefits, it follows that if, in any war, one side is not a party to the Declaration of Paris, both sides are entitled to employ privateers. In the war of 1870 Prussia who was a party to the Declaration created a volunteer fleet, a procedure which was very little removed from privateering. The United States always used to contend that a state has the right to use its merchant fleet in war, and therefore objected to the abolition of privateering. The *juste milieu* seems to have been attained by the recognition of auxiliary cruisers. Privateers were largely employed by Napoleon but they never succeeded in cutting off the essential supplies of the British Isles.

The Declaration of Paris adopted the maxim "free ships free goods", thus securing the immunity of non-contraband enemy goods on board neutral ships; and rejected the maxim "enemy ships enemy goods", thus securing a like immunity for neutral goods on board enemy ships. The United States declined to adhere to the Declaration, because she considered that it did not

go far enough and held the view that all private property at sea should be immune.

The Declaration, so far as it is concerned with the immunity of goods, was perhaps on the whole unfavourable to any very strong naval Power unless it remained neutral. A neutral, or a belligerent weak at sea gained because it could trade and carry more freely. Great Britain, strong at sea, gained in the same way — her trade being not only very great but vital to her — but she lost much by giving up the right of capture. This does not now amount to so much as before, because the late war has demonstrated that the belligerent power of declaring goods to be contraband must be unfettered, and that the old "conditional contraband" (art. 6) has become meaningless. Great Britain can still capture contraband even on neutral ships. It is argued that she benefits greatly because her food, and the materials for her vast manufactures, can now be brought to her by neutrals, but this again turns on the question of contraband and on whether the foe is sufficiently civilised to respect the law.

A merchant ship may, in order to deceive the enemy, fly the flag of any other country. She may defend herself if attacked and may carry a gun for this purpose.

A belligerent warship may hoist the flag of any nation whether neutral or belligerent, but the laws of war require that before she actually engages in a fight or attacks an enemy she must haul down the said flag and hoist her own. She may also adopt any sort of disguise or artifice.

Of recent years attempts, unfortunately without much success, have been made to remove uncertainties in international law, and some additions have been made to it. It will readily be perceived that the conduct of a belligerent may be greatly affected by his interpre-

tation of the law, by the degree to which he chooses to recognise the existence of customs or their binding force and by what, in the judgement of his prize courts, constitutes sufficient evidence of enemy destination, of the effectiveness of a blockade, and so forth. Again, circumstances are constantly changing and new conditions arising. All this causes constant disputes as to what may or may not be done. It is quite clear that international law must be progressive; general principles remaining fixed but alterations being made to suit new conditions.

It is satisfactory to note that the Washington Conference (Chap. VII. art. 1) has arranged to appoint a commission to enquire what changes, if any, in the rules of International Law are necessary and that, on receiving the report of this commission, the five Conference Powers will confer further as to the course to be followed to secure consideration by the other civilised Powers. By one of the Treaties signed at Washington it is permissible to treat as a pirate any person violating certain of the laws of war. It should be noted that such persons need not be in the service of any of the Signatory Powers.

Art. 2. Recent enactments. In October 1907 the Hague Second Peace Conference passed its Final Act which embodied seven Conventions (Nos. 6 to 11, and No. 13) relating to maritime war. In every case it is enacted that the Convention holds good only if, in any war, all the belligerents are parties to it. All the great naval Powers were represented at the Conference. Some of them withheld their agreement to one Convention or another and some of them in signing a Convention "reserved" certain articles in it. All the lesser naval Powers have since adopted most of the Conventions with reservations as to some articles. The gist of the enactments will be given below (Arts. 3,4 and 5) any cases of non-agreement on

the part of great naval Powers being noted and also reservations by such Powers when the point is of sufficient importance.

The above Conventions do not touch the great questions of contraband and blockade which are the ones giving rise to most disputes. Convention No. 12 which some considered to be the really important one, provided for the setting up of an international prize court of appeal, but Great Britain did not agree to it. Sir Edward Grey (now Lord Grey of Fallodon) then Foreign Minister, considered that no general agreement would be reached until certain points of international law had been freed from vagueness. With this object in view an International Conference was held in London in 1908—1909. The result of its deliberations was embodied in the Declaration of London. The Naval Prize Bill authorising the acceptance of the Declaration by Great Britain passed the House of Commons.

But the international court was to be composed of fifteen judges each representing a naval Power. Great Britain's representation on it would have been one-fifteenth of the whole, while the tonnage of her mercantile marine was about two-fifths of the whole. Moreover by Chapters I. and II of the Declaration of London, food stuffs coming in a neutral ship would be liable to be seized and confiscated merely because they were consigned to a place like Liverpool. On the other hand, the enemy, if a continental Power, could get his food stuffs consigned to a neighbouring neutral port. Protests against the Bill arose, to quote the words of Lord Charles Beresford, from "nearly all the chambers of commerce, insurance societies, shipping associations and business men, independent of party, many members of both Houses of Parliament and other people in high and responsible positions including King's Counsel and 138

naval officers of flag rank." The House of Lords, to its great credit, threw out the bill. Another danger to Great Britain was averted.

When the Great War broke out, the Allies, desiring to secure uniformity of procedure and to declare the principles of International Law which they regarded as applicable to contraband and other matters, adopted the rules set forth in the Declaration of London with certain modifications. The Declaration will be referred to again partly because of the fact just stated, partly because it is instructive to consider some of the provisions of its Chapters I and II. which caused its wreck, and also because its Chapters III. to IX. contain some miscellaneous provisions which indicate that the international law in the matters concerned requires amending or making clear.

Art. 3. Laws concerning merchant ships. *Status of enemy merchant ships at out-break of war.* If a merchant ship belonging to a belligerent country is, on the outbreak of war, in an enemy port, or if it arrives there without having heard of the existence of war, it is liable to seizure but Hague Convention No. 6 states that "it is desirable" that it be allowed a few days time in which to leave, that otherwise it may not be confiscated, but that it may be detained. It may be requisitioned on condition of compensation being paid. Similarly a merchant ship, ignorant of the war and met with at sea, may not be confiscated but may be detained or requisitioned or even destroyed, provision being made for the safety of those on board and of the ship's papers (Reserved by Germany and Russia). The general idea involved in the detention or "internment", whether of warships or merchant ships, is that they must not avail themselves of the shelter of neutral harbours and come out to help their side in the war just

when it suits them. In all the above cases the principle for dealing with any enemy cargo is the same as for the ship. The United States did not agree to this convention.

When war breaks out between two powers, the merchant ships of either may, in order to avoid capture, run for a neutral port and remain there, paying harbour dues. Such ships, if the said neutral joins the war against them, become enemy ships. During the recent war many German and Austrian ships were in Portuguese and United States ports. Portugal on joining in the war on the side of the Allies, seized the ships in her ports. The crews attempted to damage them but were prevented by Portuguese officials from doing so. When the United States joined in the war she also seized the German and Austrian ships in her harbours. She is not a party to Hague Convention No. 6.

When the war broke out with Germany, it was notified that some days would, with certain exceptions and stipulations, be allowed to enemy ships for departing — but not carrying contraband — from British ports, provided that equal treatment was being accorded to British ships. The two countries however, failed to arrive at an agreement — though an agreement was made between Great Britain and Austria-Hungary — and each seized ships of the other.

Unneutral Service. A neutral vessel employed entirely in the service of an enemy or acting specifically for him — this includes the carrying of his despatches — is according to British prize law liable to condemnation, and if she is helping in hostile operations or is found near to a fleet, she is liable to be sunk. By Chapter III. of the Declaration of London she is liable to condemnation only, and the specific acts are defined. Anyone on board who is "embodied in the armed forces of the enemy" may be made a prisoner, but this does not in-

clude enemy reservists on their way to join the army. Great Britain allowed many such to cross the seas, she having at first adhered to the Declaration.

Transfer of Merchant Ship to Neutral Flag. According to British prize law if a merchant ship is transferred to a neutral flag during or in contemplation of hostilities, the transfer is not necessarily invalid — unless it occurs for instance, in a blockaded port — but the onus of proving it to be genuine lies on the claimant, and if there is suspicion the vessel is liable to condemnation by the prize court. Chapter V. of the Declaration of London makes the rules more precise.

Use by a merchant ship of neutral flag. The right of a merchant ship to hoist a neutral flag in order to deceive an enemy is well established. During the recent war British ships sometimes made use of the above right to escape from German submarines. Some neutrals protested on the ground that risk might thus be caused to their own ships. An Admiralty notification deprecating such use when the merchant ship is armed is referred to below (art. 5).

Character of ship or goods. According to the prize law of Great Britain and some other countries it is chiefly the "commercial domicile" of the owner which decides whether captured goods are enemy goods. In other countries it is the nationality of the owner. In the case of a ship it is generally the flag. Chapter VI of the Declaration of London confirms this last rule [1], subject to the provisions of Chapter V. referred to above, and enacts that the character of the goods is the same as that of the owner, but no conclusion was arrived at regarding the owner, opinions being divided between domicile and nationality. It however enacts that goods

[1] See art. 8.

found in an enemy vessel are presumed to be enemy goods unless there is proof to the contrary.

Resistance to search. A belligerent merchant ship has a right to resist search, but if she resists or fails to stop when called upon to do so she may legitimately be fired on and perhaps sunk. Chapter VIII. of the Declaration of London enacts that failure to stop or forcible resistance to search and capture will involve condemnation of the vessel, the cargo being liable to be treated as that of an enemy vessel.

Search while under convoy. This has, in the past, caused grave disputes. The British Government always declined to admit that neutral vessels under national convoy are exempt from search. In the celebrated case of the Swedish convoy, Lord Stowell upheld their action as justified in law; and further that the merchantmen were liable to condemnation for resisting search. Chapter VII of the Declaration of London decrees exemption, the commander of the convoy being bound to give full information as to all the vessels and their cargoes.

It will be noticed that in several cases described above, the tendency of the Declaration of London was to substitute legal for forceful methods. The above parts of the Declaration are not those which caused its rejection.

Art. 4. Rights and duties of neutral powers. Hague Convention No. 13 which deals with these matters is of considerable length. It is convenient in abstracting it to divide it into heads as below.

1. *Neutral Waters or Territories.* Belligerents must respect these and do nothing in them which would, if permitted by the neutral Power, constitute a breach of neutrality, e. g. any act of hostility, capture or search. They must not establish prize courts in them nor use them as a base for naval operations nor set up wireless stations etc. in them. If a ship is captured in its waters

a neutral Power must, if the prize is still within them endeavour to release it and those on board and to intern the prize crew, but if the prize has gone, the captor government must on the demand of the neutral Power release it and those on board.

For a warship to engage in combat with another in neutral waters is a flagrant breach of the above rule. Nevertheless it occurs now and then. Usually an apology is sent to the neutral Power concerned. The British auxiliary cruiser India was torpedoed in Norwegian waters, on 8th August 1915, by a German submarine. For the case of the Dresden see Chapter VI art. 3.

2. *Supply of vessels or war material to belligerents.* A neutral Power must, if possible, prevent the fitting out or arming, within its jurisdiction, of a vessel intended to engage in hostile operations and it must prevent the departure of any such vessel if it has been wholly or partly adapted for war within its jurisdiction. A neutral Power may not, directly or indirectly, supply a belligerent Power with "warships, supplies or war material". But the neutral Power need not "prevent the export or transit, for either belligerent, of arms, munitions of war or in general of anything which could be of use to an army or a fleet." The export or transit would be due to the act of an individual or firm. During the Great War immense quantities of munitions of war were supplied to the Allies by firms in the United States which was neutral. If the Central Powers had obtained such supplies they would have been captured at sea.

3. *Supplies for belligerent warships.* A belligerent warship may not take in war material or armaments in a neutral port or complete her crew. She may re-victual up to the peace standard. (Reserved by Great Britain and Japan). She may ship fuel to enable her to reach her own nearest port or (in some countries which have adopted this rule)

fill up her bunkers built to carry fuel. If she is not supplied with fuel within 24 hours of her arrival, she may stay another 24 hours. She may not ship more fuel, within three months, in a port of the same Power. (Reserved by Germany).

Early in 1915, a German cruiser captured a Danish ship, the Hammershus, and put on board her a prize crew and guns and used her as a raider. Soon afterwards the Hammershus entered the Bay of Rio de Janeiro and cast anchor near some German ships which had been there since the beginning of the war. From these vessels she obtained provisions and, surreptitiously, munitions. Attempting to leave by night she was ordered to stop, and as she disobeyed, the guns of the fort opened fire. She then stopped and was interned by the Brazilian Government. There were also cases, early in the war, of ships clearing from South American ports under false declarations as to destinations, and supplying coal to German cruisers.

During the Civil War in Chile in 1891, rifles for the Congressionists were bought in the United States and shipped on board the Itata. The United States Government refused to allow the ship to leave. She however slipped away, taking with her the American guard stationed on board, was pursued by a cruiser who followed her to the Chilean port and compelled her to return without discharging her cargo.

4. *Length of stay of belligerent warship in neutral port.* Ordinarily a belligerent warship may only stay 24 hours in neutral waters and if she is there when war breaks out the neutral Power must request her to depart within 24 hours. (Reserved by Germany). In some countries the laws prescribe periods other than 24 hours. A warship may stay longer than the prescribed period, to effect repairs — only such as to render the ship seaworthy and effected

as quickly as possible — or because of stress of weather. The warship may not leave until 24 hours after the departure of a merchant ship flying the flag of her adversary.

5. *Collections of warships in a neutral port or roadstead.* The number of warships belonging to one belligerent may not at any time exceed three unless the laws of the neutral Power provide otherwise. When warships of both adversaries are present, 24 hours must elapse between the departures of ships belonging to opposite sides. The first arrival will leave first unless an extension of stay is permissible.

6. *Internment.* If a belligerent ship of war does not leave a port where it is not entitled to remain, the neutral Power may take measures to render the ship incapable of putting to sea so long as the war lasts. When a belligerent ship is detained by a neutral Power, the officers and crew are likewise detained.

7. *Neutrality.* A neutral Power must act impartially to both sides; it must be vigilant so as to prevent violation of rules. It may forbid its waters to any belligerent vessel which has disregarded orders or violated neutrality. Neutrality is not affected by the mere passage through its territorial waters of belligerent warships or prizes.

In the course of the recent war Norway prohibited the use of her territorial waters to belligerent submarines (except temporarily in case of bad weather or damage or in order to save human life and in such cases they were directed to navigate on the surface and to fly their national flag) and also to neutral submarines, except in daylight and clear weather, on the surface and flying their national flag. It was intimated that submarines acting contrary to the orders would be attacked.

8. *Prizes in Neutral Ports.* The following is the gist of the Articles of the Hague Convention.

A prize may only be brought into a neutral port on account of unseaworthiness, stress of weather, or want of fuel or provisions. It must leave as soon as the circumstances which justified its entry are at an end. If it does not, the neutral Power must employ means to release it with its officers and crew and to intern the prize crew. A neutral Power must, similarly, release a prize brought into one of its ports under circumstances other than those referred to above.

A neutral Power may allow prizes to enter its ports and roadsteads, whether under convoy or not, when they are brought there to be sequestrated pending the decision of a Prize Court. It may have the prize taken to another of its ports. If the prize is convoyed by a warship, the prize crew may go on board the convoying ship. If the prize is not under convoy, the prize crew are left at liberty (Reserved by Great Britain and Japan).

The Appam, a British merchant ship, was captured in the Atlantic by a German cruiser the Möewe, and was taken into an American port with a prize crew on board. Germany contended that she should not be released because, by an old Treaty, Prussia and the United States could take their prizes into and out of each other's ports. The American courts, however, decided that Germany lost all claim to the Appam when she brought her into neutral waters with the intention of laying her up, and that a prize cannot be brought into neutral waters without a convoy.

A similar case had occurred in the American Civil War before the Hague Convention was in existence, a converted prize the Tuscaloosa, having been brought into a British port, Simons Bay, where she was interned till the end of the war. A prize cannot legally be converted until she has been condemned by the prize court.

Art. 5. Miscellaneous laws. This article deals with five

of the Hague Conventions and some other matters. The following are the main points in Hague Conventions Nos. 8, 9, 10, 11 and 7.

No. 8. The laying of Mines. This prohibits the laying of unanchored automatic contact mines which do not become harmless within an hour, the laying of anchored automatic contact mines which do not become harmless as soon as they break loose from their moorings, and the use of torpedoes which do not become harmless when they have missed their mark. It enacts, that, when mines are laid, the danger zones shall be notified to mariners. All the above refers to mines laid in the open sea. An article prohibiting the laying of mines off enemy coasts "with the sole object of intercepting commercial shipping" was reserved by France and Germany. Great Britain made a reservation to the effect that if any procedure is not forbidden by the Convention it must not be inferred that Great Britain admits its legitimacy. Russia, Spain, Portugal and Sweden did not agree to this Convention.

At the previous Hague Conference attempts were made to totally abolish the use of mechanical contact mines but some nations, including Germany, did not agree to this. It is held by many that Great Britain should not have agreed to the Convention. The late Mr. Thomas Gibson Bowles, M. P., writing to the "Times" in November 1914 refers to it as the "Assassination by Mines Convention".

No. 9. Bombardments by Naval Forces. Undefended places are not ordinarily to be bombarded but this prohibition does not include "military works, military or naval establishments, depôts of arms or war material, workshops or plant which could be utilised for the needs of the hostile fleet or army, and the ships in the harbour". Undefended places may be bombarded (after

warning when possible) owing to failure to comply with requisitions, such requisitions being, not for money but for supplies immediately necessary for the naval force and paid for in money or receipts being given. Churches, hospitals, museums, charitable institutions, monuments, etc. are to be spared, and pillage is forbidden. Spain did not agree to this Convention. The illegal bombardment by German warships of Scarborough, Whitby and Hartlepool is referred to elsewhere (Chap. VI. art. 2).

No. 10. *Adaptation of the Principles of the Geneva Convention to Maritime War.* This provides among other things that sick and wounded shall be properly treated and hospital ships respected, the governments undertaking not to use the ships for any military purpose. During the recent war several hospital ships were sunk by Germany and one by Turkey, the allegation being falsely made that the ships were used for military purposes.

No. 11. *Restrictions on the Exercise of the Right of Capture.* This provides for the safety of mails, fishing boats and some other vessels. Also that the officers or members of the crew of a captured merchant ship shall be released on condition that if they are enemy subjects they undertake not to engage during the war on any service connected with the war, and if they are neutral subjects the officers undertake not to serve on an enemy ship during the war. Russia did not agree to this Convention.

During the recent war the Yarrowdale, a British merchant ship, was captured by a German cruiser. Some of her crew who were citizens of the United States, at that time neutral, were taken to Germany and were only released after peremptory demand by the United States.

No. 7. *Conversion of merchant ships into warships.* A merchant ship converted into a warship cannot have the

rights and duties of a warship unless it is placed under the direct authority, control, and responsibility of the Power whose flag it flies. It must bear the external marks which distinguish the warships of its nation. The commander must be in the service of the State and duly commissioned. His name must figure on the list of the officers of the fighting fleet. The crew must be subject to military discipline. Every merchant ship converted into a warship is bound to observe in its operations the laws and customs of war. A belligerent who converts a merchant ship into a warship must, as soon as possible, announce such conversion in the list of its warships. The United States did not agree to this convention.

The above contains no proviso as to notification prior to conversion. The question whether a merchantman — whether originally belonging to a belligerent or one which he has captured — may be converted into an armed ship on the high seas was not settled because no agreement could be come to in regard to it. At a conference of members of both Houses of the British Parliament, held in November 1911 to consider the question of food supply in war time, strong remarks were made as to the danger of sudden attacks on British trade by secretly converted merchant ships and strong protests against the acceptance of Convention No. 7 as it stands. Such attacks could have been made by Germany when war broke out — if she had arranged to send out the ships, in time, to different places — with appalling results.

Destruction of Prizes. It is generally agreed that an enemy prize, after the removal of the crew and papers, when it is impossible to bring her into port, may be destroyed but many countries consider that a neutral prize should be released. Chapter IV. of the Declaration of London deals only with neutral prizes

and confirms the above with the proviso that destruction may be effected only where there would otherwise be danger to the captor warship or to the success of the operations on which she is engaged, and that in such a case those on board, as well as the ship's papers, shall be taken to a place of safety.

During the Russo-Japanese war neutral prizes — among them a British ship — were destroyed by the Russians. Great Britain protested but the legitimacy of the action was upheld by the Russian prize court. It has been argued that a submarine can lawfully sink enemy merchant ships. if they are first searched and if the safety of those on board and of the ship's papers is arranged for. This matter has been disposed of by the Washington Conference (Chap. VII. art. 1). The actual conduct of the Central Powers in this connection is discussed elsewhere (Chap. VI. art. 1).

Arming of Merchant Ships. The right of a merchant ship to carry a gun or guns for defence against attack is well established. She may use them only to defend herself if attacked, or if she has a reasonable suspicion that she will be attacked. When German submarines during the Great War began to sink British and other merchant ships without visit, search or warning, arrangements were made to arm the merchant ships. The Central Powers endeavoured to persuade neutrals that such armed ships were warships and not entitled to stay in their harbours except as provided in Hague Convention No. 13. This argument was not accepted by most neutrals. Holland on one occasion prevented a British armed merchant ship from entering one of her ports until she had thrown her gun overboard. There were also proposals to restrict the guns carried to one in the stern. The United States considered that the real question was the use made of the gun or guns, and that

as long as they were used only for defence all was correct.

In 1916, the Brussels, a British merchant ship, was captured by the Germans. Her Commander, Captain Charles Fryatt, was shot, after trial by Court-martial, on the ground that he had on a previous occasion attempted to ram a German submarine, and had thus placed himself in the position of a civilian attacking armed forces.

The British Admiralty Orders issued on 20th October 1915, enjoin that the armament of a merchant ship should be used only for resisting attack, that enemy aircraft and submarines may be fired upon to prevent their closing to a range at which resistance to a sudden attack by bomb or torpedo would be impossible, that the use of disguise and false colours by defensively armed merchant ships may easily lead to misconception, and that they should not adopt any disguise that may cause them to be mistaken for neutral ships. On 2nd May 1917 the First Lord of the Admiralty replied as follows to a question in the House of Commons: — "The fact that a merchant ship is defensively armed makes no difference to the status of the captain, officers, and crew of such vessels. The only difference of treatment by the enemy that has been noticed is that those members of the crew who have been taken prisoners have been treated as combatant prisoners of war and not as civilians. Long-range guns are being supplied as fast as they are obtained."

Art. 6. Contraband. Contraband includes all things which are used only for warlike purposes, such as arms, projectiles or parts of warships. The above are termed "absolute" contraband when it is desired to distinguish them from "conditional" contraband. The latter term includes goods which may be used either for warlike

or for peaceful purposes. A belligerent has to declare what goods he intends to consider as conditional contraband. The classes of goods which may be so considered are very large and include food stuffs. As regards absolute contraband some countries have framed careful definitions of it based upon their use in war, while others have preferred to prepare detailed lists of what they consider to be contraband. The latter plan has been most in favour of recent years.

Contraband goods can only be seized when on board a ship on the high seas or in the ports or territorial waters of one or other belligerent. There must be evidence of enemy destination. The destination of a ship is of consequence only as evidence of the destination of the goods, unless the ship is a warship or unless "ships" have been placed on the list of contraband; in these cases the ship herself is contraband. In the case of absolute contraband it is sufficient, according to British prize law, if the goods are destined for any place or fleet belonging to or occupied by the enemy, but in the case of conditional contraband there must be evidence of destination for the enemy forces or for places of naval or military equipment or evidence of fraudulent concealment or spoliation of papers. Thus food stuffs destined for Liverpool could be seized, even if in a neutral ship, at the discretion of an enemy captain.

It was remarked by more than one writer during the war that at the present day when "armed forces" consist of whole nations, there is no reason for making any distinction between absolute and conditional contraband. The removal of the distinction would simplify matters greatly and the distinction was at last definitely ignored by Great Britain.

A ship carrying contraband may be captured at any point of her voyage but not after it is over. The con-

traband goods, when proved to have enemy destination, are condemned by the prize court. According to British prize law if the owner of the contraband has any interest in the ship that interest is liable to condemnation. By Chapter II. of the Declaration of London it is enacted that if more than half the cargo, estimated by weight, volume, value or freight, is contraband the ship should be condemned.

Of enormous importance in connection with contraband is the question of "continuous voyage". The principle was applied first to a ship whose papers were made out to a neutral port and which proceeded there but subsequently went on to an enemy port. Then, in order to stop further evasion by traders, it was applied to goods which were transhipped at the neutral port — and even passed through the customs — and went on to the enemy. The test in this case is whether the goods are intended to form part of the "common stock" of such goods at the neutral port or to find their way to the enemy. It has been contended that if goods so pass into the common stock they have reached their intended destination even though the neutral port may be a well known market for the belligerent to seek supplies in, and the goods may have been attracted by this circumstance. An article in Brassey's Naval Annual for 1916 ("The Neutrals and the War" by Sir Francis Taylor Piggott, M.A., L.L.M.,) rightly characterizes this as sophistry. He explains how the goods can be made to change hands several times and points out that the original shipper and the consignee may both be of enemy nationality. The following remarks by Sir Edward Grey — in a Memorandum dated 24th April 1916, presented to the United States Government — refer to some goods sent to Sweden: — "If they had been intended to form part of the common stock, they would

have been available for use in that country; yet at one time in the early days of the Allies' efforts to intercept all the commerce of the enemy, when they found it necessary to hold up certain cargoes of cotton on their way to Sweden, it transpired that though the quays and the warehouses of Gothenburg were congested with cotton, there was none available for the use of the spinners in Sweden." The Memorandum is an admirable one and refutes many allegations.

There are of course many cases in which it is impossible to prove that goods, even though intended to help the enemy, do not go into the common stock. The goods may be parts of some machinery or product, the other parts being furnished by the neutral country. The principle of continuous voyage had, before the war, been recognised only in the case of goods which are absolute contraband. It is recognised in Art. 30 of Chapter II. of the Declaration of London as regards absolute contraband, nothing however being said about common stock.

When the Great War broke out, the Allies decided (art. 2) to abide by the Declaration of London "so far as might be practicable". In that Declaration, lists are given of articles of absolute and conditional contraband and it is stated that additions can be made to either list. A list is also given of articles which may not be made contraband of either kind. This list includes raw cotton, rubber and metallic ores. Very early in the war the Allies declared copper, glycerine, rubber and certain ores to be conditional contraband [1]. This shows the danger involved in agreeing to any such *index prohibitorum*. The fact that cotton — which is used for explosives — was not at the same time included, has been quoted as showing the urgent need for greater

[1] See also art. 8.

attention to science in the British system of education. Cotton was made contraband later, see Art. 7.

Art. 7. Blockade. The old rules for blockade were fairly simple. The blockade must create a definite risk of seizure to vessels attempting to enter the blockaded port, and it must be impartial as regards all nations. It must not include neutral ports, and the blockading force must not obstruct access to such ports though it might be at any distance from the enemy coast. Breach of blockade involves confiscation of ship and cargo if the ship is caught. It is an attempt to help the enemy, and the ship becomes liable to be treated as an enemy. No penalty is imposed if the ship runs safely into harbour.

Occasionally a "pacific blockade" is put in force in order to exercise pressure on a country without going to war with it. In any such case special rules are made as to neutral ships and other matters.

In British and American prize law breach of blockade includes an intention to break it and a ship can be seized at any point of her voyage, if the intent to "run" a blockade is proved; this applies even at the very commencement of her voyage. The Declaration of London did not contain anything of this sort. On the contrary, Articles 17 and 19 of Chapter II made it illegal to seize a vessel except within the area of operations of the blockading ships, and also illegal to seize a vessel if, at the moment, she was on her way to a non-blockaded port, whatever her ultimate destination might be. It is undesirable to weaken the effect of a blockade for the same reason that it is undesirable to decree immunity for all private property at sea. The pressure which can be exercised by means of the present custom shortens wars and is humane in its action.

In March 1915, the Allies decided to prevent all

supplies from reaching Germany and all German exports from coming out. They proceeded accordingly. In old days the ships of a blockading force kept within sight of the blockaded coast or not far from it. In the case now under consideration this plan could not be adopted because of danger from enemy mines and submarines, and also because it would have been useless to blockade the ports of Bremen and Hamburg while leaving Copenhagen and Rotterdam free. The warships watched the Straits of Dover and the passage between Scotland and Norway. It was what is now termed a "long distance blockade". It obviously interfered with, even if only temporarily, ships bound for or coming from ports in the "border neutrals", that is Norway, Sweden, Denmark and Holland. The old-fashioned blockade might not do this. It might not bar access to neutral ports. The case is a notable instance of change of circumstances necessitating change in international law though, it is important to insist, no change has been made in any essential principle.

Further the Allies did not "declare a blockade". One reason for this was that it might have involved them in disputes with neutrals over a mass of legal technicalities — the "legal niceties" to which Mr. Asquith referred — the old "close" blockade being assumed to be the only legal kind. Nor did they order, as in the old blockades, confiscation of ship and cargo in case of breach of blockade. Owing to the difficulty, amounting often to impossibility, of examining ships at sea, it was arranged that ships trading between America and the border neutrals should put in for examination to a British port or territorial waters, generally Kirkwall, Lerwick, Dartmouth, Falmouth or the Downs.

Some time after the institution of the long distance blockade the Allies declared cotton to be contraband.

This was quoted as an admission that the blockade was ineffective in preventing shipments of cotton from reaching the enemy. Actually cotton was made contraband because it was being used solely for warlike purposes, and it was desired to confiscate it. (See Memorandum referred to above). Under the blockade rules it was, like the goods which were stopped, returned to the owners.

Besides the above there were blockades of the Austro-Hungarian ports in the Adriatic and of parts of the coasts of Asia Minor and East Africa, but these were the old close blockades.

Does the doctrine of continuous voyage apply to blockade? Under the old kind of close blockade it could not apply because the blockading squadron was drawn close round the enemy port. If the port blockaded was Hamburg it was "illegal" to prevent access to Rotterdam, but as a matter of fact the squadron, being off the mouth of the Elbe, did not affect ships going to Rotterdam. Sir Francis Piggott in the article above referred to (Art. 6) remarks that the long distance blockade under discussion was recognised by President Wilson, "a large and wise development on the side of progress, a recognition of the spirit which alone can keep international law alive". The recognition, however, was only that of the legality of shifting the position of the ships to a long distance away. The legality of blockading Hamburg a long way off was admitted, but of interfering with ships going to Rotterdam, which would now have to pass through the blockading squadrons, not admitted. It was argued that the long distance blockade did not alter the old principles. To this Sir Edward Grey replied that there was now a net-work of railways, that Germany could draw her supplies as easily through Rotterdam as through Hamburg, and that the only way to make the action of our blockading squadron effective was

rigidly to enforce the doctrine of continuous voyage. Americans themselves, dealing with contraband trade in the Civil war, had applied the doctrine of continuous voyage to it because that was the only way of stopping it. The decisions of their prize courts were in full conformity with international law. The essential right of belligerency is to prevent supplies from reaching the enemy. The old doctrine was only a means to this end. So also is the long-distance blockade, and this on the face of it would be incomplete and ineffectual unless the doctrine of continuous voyage were applied. The best expert opinion holds that no principle of international law was violated by the institution of the long distance blockade (Order-in-Council of 11th March 1915). It contains only new applications of old principles.

Art. 8. Belligerents and neutrals. Ever since contraband laws have existed, traders have set themselves to evade them. During the first twenty-three months of the Great War the Allies made change upon change in the Declaration of London which they had adopted, as explained above, as a convenient code of reference, but which proved very inconvenient and unadapted to war necessities. They made additions to the class of person to whom, and the class of ports to which, conditional contraband must be consigned in order to be liable to capture. They made a neutral vessel liable to condemnation if she had papers made out to a neutral port and proceeded to an enemy port. They cancelled Article 57, in Chapter VI of the Declaration, which enacts that the character of a vessel is determined by the flag which she is entitled to fly; and also the somewhat incomprehensible Article 19, in Chapter I., which prohibited the capture of a vessel for breach of blockade if at the moment she was on her way to a non-blockaded port. All these changes were made to meet new devices by which traders sought

to get their goods through to Germany. The Allies placed the doctrine of continuous voyage on a firm and broad basis and made it applicable to both kinds of contraband and to blockade. Finally, finding the Declaration of London much more inconvenient than useful, they abandoned it and declared that they would act, as had always been intended, in strict accordance with the law of nations. Some enactments bearing on the above points and on others were published in a compact form. (See the Maritime Rights Order-in-Council, dated 7th. July 1916).

As an example of the unpractical nature of many of the provisions of the Declaration of London, it is laid down as regards conditional contraband that the ship's papers afford absolute proof of her destination unless she is out of her course and unable satisfactorily to explain this. A striking commentary on this is provided by the following passage in the Memorandum, above referred to: "Nowadays the conditions have changed; the papers may outwardly be perfectly genuine and complete, yet they may have been prepared with the express purpose of concealing the real nature of the transaction. These misleading papers would not, however, occasion any difficulty in dealing with the goods on their arrival, because the necessary instructions to the consignee can be conveyed by other means. Consequently the old rule that the papers on board the ship must alone be taken into consideration, is no longer practicable; indeed, the system of attributing to the ship's papers the character of final and conclusive proof, upheld in the United States Note, would encourage shippers of contraband to falsify the papers, as they would thereby ensure immunity from capture."

One allegation made by neutrals was that the Allied measures taken against Germany, involving curtailment

of neutral rights, were illegal because retaliatory. To this Sir Edward Grey replied as follows, in the Memorandum above referred to: "His Majesy's Government are quite unable to admit the principle that to the extent that these measures are retaliatory, they are illegal, It is true that these measures were occasioned and necessitated by the illegal and unjustifiable proclamation issued by the German Government on the 4th February, 1915, constituting the waters surrounding Great Britain, including the whole English Channel a "war zone", into which neutral vessels would penetrate at their peril, and in which they were liable to be sunk at sight. This proclamation was accompanied by a memorandum alleging that the violation of international law by Great Britain justified the retaliatory measures of the German Government owing to the acquiescence of neutrals in the action of this country[1]. The legitimacy of the use of retaliatory measures was thus admitted by the Germans, although His Majesty's Government and their Allies strongly deny the facts upon which their arguments were based. But although these measures may have been provoked by the illegal conduct of the enemy, they do not, in reality, conflict with any general principle of international law, of humanity, or civilisation; they are enforced with consideration against neutral countries, and are therefore juridically sound and valid".

When there are conflicting rights a settlement may be arrived at by bargaining. Independently of the blockade a system of bargains was entered into by Great Britain with the traders or shipowners, subject to such control as the Governments chose to exercise. There were various bargaining assets. Great Britain exported coal or supplied bunker coal to ships. She could refuse supplies to

[1] This refers to making food stuffs conditional contraband, see Chapter VI. art. 5.

neutrals except under certain conditions as to trading with her enemies or with persons as to whom there was evidence that they traded with her enemies. Sweden had at certain seasons control of the shortest route for the passage of mails and other things from Great Britain to Russia. Germany supplied coal, steel and other goods to border neutrals. She also possessed an asset in her power to invade them. They again supplied certain articles of food and other products to Germany and to Great Britain. If their import of foods, or of nitrates which help to produce foods, were much restricted they might be able to export less food, and in that case it might be Great Britain who would suffer. An asset held by the neutrals was that it was important for Great Britain to keep up her export trade and to be thus able to continue to import munitions, and also many kinds of food supplies. This was forgotten by some who advocated forceful methods against neutrals.

Into all this bargaining a system of "rationing" entered, it being taken as a basis for bargaining that a neutral country had a right to import any kind of goods to the extent that she required them for herself, but that she had no right to import them in order to export them to Germany. It might appear that some system of rationing would afford a basis for a set of international laws to be arrived at in time of peace, but the subject bristles with difficulties chiefly because a great war may cause a wholesale disturbance of trade.

In some of the discussions the expression "freedom of the seas" was used. It was not clearly defined. It was pointed out by Mr. John Leyland (the "Nineteenth Century", February 1917) that the phrase could have no meaning except in time of war, that no-one had explained it, that it might possibly have some bearing on rights of capture at sea and that any proposals regarding it

must be received by Great Britain with the utmost caution.

One of the services rendered to his country by the late Lord Northcliffe was to obtain from President Wilson, by a personal interview, a recognition of Great Britain's position in this matter and to secure its exclusion from discussion at the Peace Conference.

Every now and then some writer or speaker becomes pessimistic as to international law, asserting that war is the negation of law, and so on. The late Admiral Mahan of the United States Navy, is said to have once expressed the fear that a strong naval Power might throw over regulations and proceed as she liked. This throwing over has certainly been effected (See Chapter VI. art. 1) but the strongest naval Power was not the one which began it. Actually there is a genuine desire on the part of civilised nations to govern their belligerent action, as it affects neutrals, by some definite rules. Lord Curzon once mentioned in the House of Lords the extreme anxiety of the British Government to deal fairly with neutrals. When a nation jettisons law, confusion of course occurs. In whatever way international law was stretched by the British, the procedure as already shown, violated no accepted principles. The German procedure was not only direct tramplings underfoot of accepted and agreed-to Conventions, but went to the extreme of barbarism.

It has been stated by Sir Julian Corbett ("Official History of the War. Naval Operations." Vol. II). that any belligerent nation which much disregards international law, is apt to raise up enemies among neutrals. But that is only when the interests of the neutral are affected. As regards the simple question of humanity neutrals stood aloof. Where a storm of protests to Germany might have been expected, there were none.

CHAPTER V.

NAVAL WARFARE.

Art. 1. Command of the sea. Much wordy warfare has arisen over the meaning of the expression "command of the sea". It is now generally — and will be here — taken to mean "control of sea communications". The expression "a fleet in being" has also given rise to discussion. It has been said that the Russian fleet at Port Arthur in 1904 was not a fleet in being because it did so little. But the Japanese could not have disregarded it without incurring the gravest risks. They could not be certain what it would do. A "fleet in being" means a fleet which is capable of acting.

Anyone possessing command of the sea is at liberty as to the movements of his warships, transports and merchant ships while his enemy is crippled as to all three. It has been remarked by Admiral Mahan that command of the sea does not imply that an enemy's ships or small squadrons cannot steal out of port, cross the sea and give trouble. The enemy must be crippled but need not be totally helpless. Such a state of affairs exists when an enemy fleet is so shattered in a naval battle that it is no longer of much account. It is sometimes said that command of the sea can only be obtained by such a battle and that it cannot be obtained by "masking" or "containing" the enemy fleet, that is shutting it up in a harbour or confining it within particular waters. Such a statement is erroneous. An enemy "fleet in being" is likely to be a cause of inconvenience

to his opponent, if for no other reason than that he has to employ at least some part of his own fleet in watching it, but there is nothing impossible in a strong naval Power, or combination of Powers, shutting up an enemy fleet and holding it, even without using all his own fleet, by a force of such superior strength that the enemy fleet cannot come out without being destroyed. The Power concerned then has command either of all the seas or — if the enemy is confined to an enclosed sea and not to a harbour — of all the seas except that one. Such a command is of course not so perfect as when the enemy fleet has been destroyed. There are degrees of control. It is sometimes said that the expression "command of the sea" is inconvenient and wanting in scientific accuracy. It seems to be free from objection if rigidly defined as above.

In the Spanish-American war of 1894 and again in the more recent Russo-Japanese war, the victorious navy had the command of the sea towards the close of the war. In the recent Great War Germany possessed command in the lower Baltic and in the waters between Denmark and Scandinavia. In the Black Sea, Russia very early in the war acquired a marked superiority over Turkey and Germany. In the sea of Marmora, Turkey and Germany, all through the war, possessed command. On all distant oceans of the world the Allies soon acquired the command. Allied ships of all kinds went where they would while enemy transports or merchant ships were not able to show themselves; nor such of their warships as navigate on the surface except for a few raiding cruisers whose careers were generally short.

In the seas near the coasts of Great Britain and France, and in the Mediterranean, the Allies had the command but the action of the enemy submarines was such as gravely to threaten the Allied control of some of the

lines of communication so far as concerned their ability to keep merchant ships plying. But even near the British Isles the Allies were able to maintain a blockade of Germany which caused her the gravest trouble and exercised great influence on the war.

A great naval battle which gives the command of the sea to one side never actually terminates a war but it is frequently the really decisive event, enabling the belligerent which has been victorious at sea to transport his troops where he will and so to terminate the war, or to blockade the enemy, cutting off his supplies and so causing him excessive trouble. These results were achieved by the Allies against Germany. British naval policy has usually been based on blockade.

Art. 2. Strategy. Yet another instance of a term which has given rise to discussion is furnished by "strategy". It is derived from the Greek and originally meant the handling of an army. Strategy has been defined as the art of bringing an effective and complete force to a given place at the proper time, tactics as the art of using it to the best effect when there. The terms are now usually defined as the arts of conducting war, tactics when in the presence of the enemy, strategy when not in his presence. Regarding strategy, Admiral Sir Cyprian Bridge considers ("Art of Naval Warfare") the above definition to be insufficient and remarks that strategy really means compelling the enemy to fight at a disadvantage. The strategist — according to Napoleon, one who devotes most of his life to learning "the high parts of war" — endeavours to bring superior force to bear on the enemy, to divine his plans, to conceal his own plans, to utilise any kind of natural or artifical advantage which can be conferred by position, time or circumstance. Nowadays he tries to obtain weather reports and so to forecast the weather. Tactics differs from strategy in being confined

to the locality of the fighting. The line between the two cannot always be drawn exactly.

The principles of naval strategy are unchangeable but their application varies. A very essential part of good strategy is good scouting. Good strategy is not to be judged entirely by results. Napoleon took an invading army to Egypt but it narrowly escaped being overtaken at sea by a British squadron, and the ships which carried the invaders were subsequently destroyed. It has been said that the British and French armies which were conveyed across the Black Sea to the Crimea in 1854, might have been made to suffer such appalling losses if the Russian fleet in Sebastopol had come out, that the war would have come to an end at once. Actually the Allies kept the command of the sea unbroken and were able to keep open their long lines of sea communication throughout the war. (Encyclopaedia Britannica, Art. "War").

The first act concerned with sea warfare in the recent Great War was the mobilisation of the British Fleet and the taking up of their proper stations by its various parts. This was done before war was declared. The credit for it is due jointly to Mr. Winston Churchill who was First Lord of the Admiralty and to the late Lord Milford Haven who was First Sea Lord. But for this action, attacks in force might have been made on the shores of the British Isles, and at least the number of enemy cruisers on the ocean trade routes would have been greatly increased.

The commander of a superior fleet generally attempts to bring the inferior fleet to action. If this cannot be done he places himself in such a position that the inferior fleet, if it moves out, must encounter him. Nelson remarked that he had never blockaded the enemy fleet. He had always given it a chance to come out and fight. The posi-

tion of the superior fleet, owing to the introduction of submarines, mines and torpedoes, must nowadays be further away from the enemy waters than of yore. The position may, of course, be temporarily brought nearer if the fleet is cruising. This happened at the Battle of Jutland. The British Fleet was cruising. It went out to waters which are three times as far from its own bases as they are from the German bases. The very great advantage of fighting near to one's base is obvious. With a nearer British base the Warrior would have got home. With a more distant German base more of the German ships would probably have been lost. The Marlborough, although torpedoed, made the journey of 300 miles to her base and got in safely.

The weaker side may make attacks and raids and try to wear down his enemy. He rarely comes out to fight him in strength. Superiority in force is one of the great objects of strategy and was so in Nelson's time.

Just as, in land warfare, "Providence fights on the side of the big battalions", so in a naval battle it is usually superiority in gunfire which governs the decision. One great object of strategy is to have such a superiority, and one method of achieving this is to compel the enemy to divide his forces. There is also the psychological factor. In the twenty years of Napoleonic war (referred to in Chap. I) the battle was not always to the strong. Morale is an important factor in any battle. If the enemy, owing to previous defeats or to other causes, suffers from inferiority of morale that is a gain to the other side and may be compared with superior training. In many an instance the knowledge that his men were superior in training or in morale has impelled a commander, though his force was inferior in actual strength, to seek battle and the training and morale have helped to win it. The psychological factor is sometimes spoken of as something inde-

finite and indefinable, some impulse which sends a commander into the fray and brings him through. An impulse may sometimes send him in. It will not necessarily bring him through. The action of the destroyer Mary Rose is described in Chap. VI. art. 7. Nelson attacked at Trafalgar with a force inferior in actual strength but he had the "weather gauge" and he knew his superiority in other respects and saw his way to victory. Until quite recently there was current in some quarters, an idea that a British naval force must always attack an enemy. There never was any such rule — Nelson distinctly disclaims being one of those persons who attack rashly — and there is no such rule to-day. In 1812 the British Admiralty directed Captains not to engage American ships of superior force. It used to be said that the frontier of the navy is the enemy coast. The battle of Jutland was fought not far from the enemy's great naval bases. Then came a controversy in the "Times". On the one side it was contended that in these days of mines and submarines the old rule cannot apply and that our fleet should not have gone out so far; on the other side that the rule still applies and that all was right. There was a tendency to dogmatise and to lay down fixed rules. There is no need to observe the custom above referred to with lack of judgment. The question when and where to fight must be decided in each case after taking all the circumstances into consideration. Sometimes it is necessary to attack with no hope of winning, in order to inflict damage on the foe, as Nelson was prepared to do when returning from the West Indies in pursuit of Villeneuve.

There was also debated in the "Times" the question whether the British fleet, instead of adopting an anchorage in the North of Scotland and establishing a line of blockade in northern waters, should not have made its base

further south and have attacked and destroyed the German fleet, secured command of the Baltic and enabled the German submarine bases to be dealt with. This question arose when German submarines had begun to sink merchant ships in large numbers (Chap. VI. art. 1) and when the extreme difficulty of dealing with them was seen. If this state of affairs could have been foreseen a great attack on the German fleet might have been proper. As it was her fleet was held in control. No doubt it was considered — everything being taken into account and the gains and losses weighed — that the probable gain by an attack was not worth the probable losses.

Naval Schools of Thought. The discussion just mentioned showed again the same tendency to lay down fixed rules. Precedents were quoted — Nelson had said that he and the French "would not part without a battle" — as if this settled the matter and the British ought always to attack. The matter was discussed as one of principle, there being, it was clear, two schools of thought one of which advocated the destruction of an enemy's fleet and the other did not. The latter of the two schools has been called the "defensive school". A recent writer in the press has stated that there is no such school, the term having been invented by amateurs. The name "defensive" may have been invented, but of the existence of the two schools there is no doubt. They were referred to not long ago in the press by "A Naval Officer", and by Lord Sydenham. One school considers that the British Navy need only maintain Great Britain's sea communications and deny them to the enemy. The other school holds that the Navy must constantly seek decisive victory. When the war broke out the former school was in the ascendant. The latter has since asserted itself. Both the above writers insist that it is vital to decide which school should dominate the naval policy of Great Britain

Admiral Sir Cyprian Bridge has quite recently denounced in the press what he calls the "materialate" school, a school which relies chiefly on fortified naval bases, big ships, big guns, and more and more of them. These things are necessary. Without them how is superiority in gunfire, emphasised by writers on strategy and referred to above, to be attained? Sir Cyprian Bridge's complaint seems to be that the "materialists" rely too much on them and he implies that the policy of their school is mainly defensive, for he states that the opposite school relies more on great mobility, high efficiency and "determination to attack".

In almost any situation which arises or can arise, there are and will be differences of opinion as to the best action to be taken. Generally one side counsels more caution than the other. One school would at Jutland have done as Lord Jellicoe did, the other would have risked more, and would probably have destroyed the German Fleet. Naval officers are sharply divided on the question. The latter school appeals most to the public.

Art. 3. Tactics. Naval tactics, like strategy, depend of course on circumstances though there is a greater number of general rules. Some devices are to engage an enemy and lead him towards a superior supporting force or a minefield, to manoeuvre him into a position where he will be at a disadvantage as regards the light or wind or smoke, to get — if it is desired to bring on a general action — between him and his base, or any port or support to which he can turn. Great care is needed when friend and foe are liable to be confused. In pursuing an enemy it is dangerous to follow just in his wake, lest he should throw mines overboard. Destroyers, by burning an excess of oil, can emit great clouds of black smoke which shut out the enemy's view from ships of their own side.

The question of range is of vital importance. The guns of one side have often the longer range and it is then the object of that side to fire on the enemy when at such a range that he cannot reply effectively. It is customary for a ship to fight with the broadside to the enemy so as to utilise the greatest number of guns, but sometimes she fights with the bows towards him so as to present a small target. In this case, however, the number of guns that can be used against him is greatly reduced and the plan is only adopted in special circumstances, e. g. when the broadside guns are largely out of action or in chasing a fleeing enemy. Admiral Waymouth has expressed in the "Times" the following opinion as to broadside and end-on fighting: "When in action they expose the whole of their vitals to torpedo and gun fire. In my opinion all capital ships should be built for "end-on" fire only, and when in action should always manoeuvre in line abreast. They should be double-ended, with screws and rudders at each end, with equal speed ahead or astern. In this manner a 4-inch steel deck and 4-inch inclined armour at the ends would give all the protection required, and at the same time the menace from torpedo attack would be reduced to a minimum". Lord Fisher was also an advocate of end-on fighting.

The ramming of one large ship by another is not a common practice. At the battle of Lissa in the Adriatic, in 1866, the Italian ship Re D'Italia was rammed by the Austrian ship Ferdinand Max, but it was done on the spur of the moment — the Austrian ship having suddenly appeared a short distance ahead — and not deliberately. A small error in judging distance or speed may cause the attacking ship to miss her mark, and she may then be in imminent danger of being rammed herself.

One object of tactics is to obtain a concentration of

fire on an enemy. In Fig. 8 a fleet is shown crossing the head of the enemy's line. This is known as "crossing the T". The crossing ships can use their broadsides and can concentrate fire on the leading ships of the enemy, while the latter cannot reply effectively.

In a naval action in which the ships on each side are equal in number, each ship can fight her opposite number. In this case no enemy ship is left free from the disturbing effects of being attacked. But there is an advantage in quickly destroying or disabling an enemy ship even at the cost of leaving one or more of them undisturbed. It improves morale. If the ship in question is the leader, there may be the further great advantage of putting the flagship out of action and so upsetting the enemy's plans. For these reasons there may be a concentration of fire on a ship and particularly on the van. In the days of sailing ships, the advantage of this procedure was greater than it is now. In the present days no fire control should be left undisturbed. The Germans, however, have continued to adopt the plan of concentration of fire on one or more ships (Chap. VI. art. 2 — Action of Dogger Bank — and art. 6).

Fleets of large ships are divided into divisions and squadrons which may each contain about four ships though no number is definitely fixed. A "flotilla" of destroyers in the British navy generally consists of twelve to twenty ships under a "flotilla leader" which is a larger type of destroyer. A flotilla may act as a whole under the flotilla leader but it often acts in divisions each of which may consist of four destroyers one of them acting as leader. In time of war when a squadron of battleships or battle cruisers is at sea, light cruisers are attached to it for scouting purposes, and it has to be escorted by destroyers in case of attack by enemy submarines or destroyers. Transports are similarly escorted.

A usual formation for battle is "line ahead" the ships following one another in one line and "keeping station" that is a fixed distance apart. All such ships can fire broadsides. When such a line of ships takes a turn to port or starboard "in succession" each ship turns when it reaches the point where the leader turned, and it continues to be in line ahead with the ships in the same order as before. If all the ships "turn together eight points" (Fig. 9) they come into "line abreast". Another turn of eight points brings them again into line ahead. In a "line of bearing" (Fig. 10) the ships are on parallel courses but not in one line. They can fire with their broadsides as if in line ahead. This formation may be adopted in order that the smoke of one ship may not give trouble to the next, or for ensuring ahead and astern fire of each ship. A line abreast formation — several parallel columns — is used when ships are cruising, chasing or fleeing.

The quickest way in which to reverse the direction of a line of ships is for all to turn together but this makes the rear ship become the leading ship. Suppose a squadron of four battleships to be leading and one of four cruisers to be following, the enemy being on their starboard side. The battleships can turn together (Fig. 11) and the cruisers can run past them and then turn up astern of them. While the battleships are turning and cannot fire with their broadsides they are covered by the cruisers. Their own fire is, however, "masked". Whether this condemns the manoeuvre depends largely on the need for it, and on other circumstances one of which is the relative strength of broadside fire of the battleships and the cruisers. For instances see art. 6.

All the ships in a squadron should be as nearly as possible alike as regards speed, gun-power and ability to turn. The smallest circle which a ship can steam round is known as her "turning circle". Its diameter is greater,

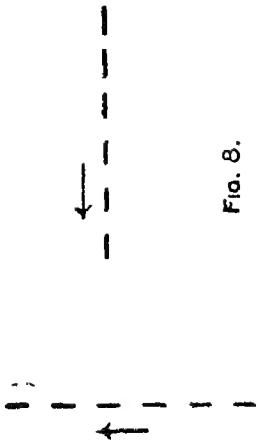


Fig. 8.

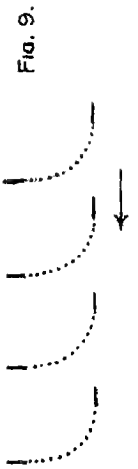


Fig. 9.

Fig. 10.

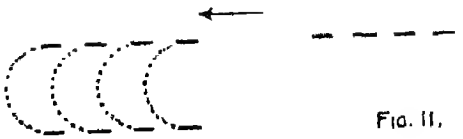


Fig. 11.

for a given ship, at a high speed than at a low speed.

Disguises and devices of all kinds are of course adopted on occasion. German submarines frequently disguised themselves as fishing boats or lifeboats, sent up signals of distress and then torpedoed the ships which came to give help. A destroyer has had a white wave painted on her bow so that when stationary she appears to be going at full speed.

Anti-submarine tactics are considered in Chapter III. art. 9, and Chapter VI. art. 5. Aircraft work is dealt with in Chapter III. art. 4, and in Chapter VI. art. 5. In Chapter VI. art. 6 some remarks are given regarding cruising formation, deploying and the tactics adopted when an attack is made by destroyers.

Art. 4. Operations of naval war. In naval war, attacks can be made on enemy commerce, warships, ports or troops and their supplies. Neutral ships are also interfered with, and perhaps drastically dealt with, if they attempt to convey contraband goods to an enemy or to enter or leave a blockaded port or area. The crippling of an enemy's trade is generally of the very highest importance to a belligerent and may be the means of his gaining the victory in the war. One object in a naval war is to get rid of the enemy fleet or to minimise the damage which it can do but this is not necessarily the chief object.

Sir Percy Scott has stated the usual operations of naval war to be the following:

(1) Port bombardment
(2) Blockade
(3) Convoy of troops
} or the prevention of these.

(4) Fighting the enemy fleet.

(5) Attack on enemy commerce and prevention of attack on own commerce.

The actual operations may be complicated and vary greatly in importance. In the recent Great War the

operations of searching neutral ships, laying and sweeping up mines and hunting down submarines, were carried out on a vast scale and necessitated the employment of great numbers of ships temporarily added to the navies for these special purposes and especially to the British Navy. The laying of a minefield necessitates among other things, careful surveying work and marking the positions for the mines.

Much of the work to be done by ships of war consists in scouting for the purpose of obtaining information or in searching for and attacking enemy commerce. It also consists in searching for and attacking enemy ships which are doing either of the above and more especially — in the case of Great Britain — enemy ships which are attacking commerce. For the above classes of work speed is of paramount importance. For work on distant seas cruisers and auxiliary cruisers are used. Small ships would not be suitable because they must have a large radius of action and be able to fight considerable enemy forces. The work nearer home is done by light cruisers, destroyers, submarines, torpedo boats or aircraft. If commerce is being attacked by submarines the danger is best met by destroyers, aircraft, patrol boats and armed auxilaries of special types. In scouting, ships of various kinds may act together, light cruisers being thrown out in advance and based on battle cruisers and these on battleships. There may be destroyers or submarines or aircraft in advance of the light cruisers. "Linking" or "repeating" ships are used for sending messages on.

Another class of operation is the carrying out of raids on enemy ports or coasts. Usually the raider must return quickly for fear of being overwhelmed and he employs very fast ships which may range from battle cruisers to destroyers according to circumstances.

In long bombardments of ports or coasts or forces on land, very large ships can hardly take part, because of the danger from torpedoes. Monitors can carry heavy guns into shallow water and so approach nearer to their objective and be free from submarine attack.

In carrying out a blockade and searching neutral vessels, there is the same objection to using large ships. In the blockade of Germany there were blockading squadrons perhaps ten miles apart but they kept moving and the intervening spaces were patrolled. Whether for blockading or for watching an enemy's ports, ships cannot now — as already stated — lie close in because of the danger from mines and torpedo attack. The enemy's small ships can come out and scout with more freedom than formerly.

Another class of work consists in escorting large ships of war or unarmed or lightly armed ships engaged in minelaying or mine-sweeping. The chief danger to be met is attack by submarines. The chief vessels to meet the danger are the destroyer and patrol boat and others already mentioned. The escorts of convoys and transports are usually destroyers but occasionally cruisers. At the ends of the voyages aircraft may assist.

A big naval battle is fought by battleships or battle cruisers. Light cruisers and destroyers are usually present and take part. Battles are also fought by cruisers alone, by any of the smaller ships alone or between mixed forces.

The transporting of troops can be accomplished without command of the sea if the enemy fleet can be evaded. Otherwise it is likely to be hazardous because of the chance of the transports being sunk. The Japanese transported troops to Korea in 1905 without having command of the sea but they knew where the Russian fleet was and had reason to believe that they could

contain it or head it off or defeat it if it came out. The cases of the transport of troops to the Crimea by the French and British and to Egypt by Napoleon have been already mentioned. A special case of the transport of troops is that which is undertaken when an enemy country is to be invaded. In this case the belligerent must not only be able to get the troops across, with their supplies but to land them in face of opposition on shore and keep open communication. In the case of a country which is well defended by a navy and by troops on shore, a sudden invasion is not at all likely to amount to more than a raid. The collection of a vast fleet of transports can hardly be effected rapidly and secretly and even if effected the expedition would run the gravest risks. The invasion of Great Britain is all but impossible unless her navy is first shattered.

It will be noticed that in nearly every kind of operation of war the destroyer may take a part. It is often sent out on work on which a bigger ship could not be risked. The very great value of the destroyer and also the immense risks which it runs were amply demonstrated in the recent war. It took part in every big action except the battles in the far distant Southern Seas. It stood by under fire to take off the crews of the sinking ships. There is little rest for its officers and men. The weather alone constantly subjects them to danger and exposure. The bridge on a stormy night in winter is as bad a place as can be imagined.

Light cruisers also proved themselves to be of extreme value.

It generally happens that in any naval engagement between large ships a considerable proportion of those engaged are sunk and others badly damaged. The projectile most used is common shell and in a very large number of cases a ship is set on fire by it. Either this or the

immediate effect of the shell may cause her to sink or to blow up. Generally the range is too great for torpedoes but when destroyers are present they can quickly close the range. Submarines now and then do the same. The range is usually too great for the secondary armament to come into use but at a moderate range it can rain a great weight of projectiles on an adversary. In fights between destroyers the gun is the weapon chiefly used.

The question of ships *versus* forts, like some other questions discussed above, does not admit of a general solution applicable to all cases. Some forts at Tsing-tau, and at Akaba in the Gulf of Suez and at Turba in the Red Sea, were quickly silenced by fire from big guns. At the Dardanelles the case was otherwise. One advantage possessed by a fort is that it can find the range with far more accuracy than a ship can find it. Also there is no limit to the number of guns mounted in a fort and dropping shots may be necessary for its disablement. For the ship to win, it must have a great superiority in weight of metal.

Art. 5. Naval wars, 1812—1894. *The war of 1812.* This war, between Great Britain and the United States, broke out while the Napoleonic war was as yet unfinished It gave rise to no fleet battles but to many minor actions and especially to duels between frigates. In the first year of the war the United States were successful in most of these fights. The reason of this was the over-confidence of the British. The American ships were manned by sailors picked from the people of the coast, one of the finest of seafaring communities. These American successes were stopped when the British sent more squadrons across. The British transported troops and almost destroyed American trade.

The Crimean War. Before the war, on 30th Novem-

ber 1853, the Turkish fleet at Sinope was destroyed by the Russian fleet, the latter alone having guns which threw shells instead of shot. During the war the Allies operated in the Baltic so that Russia was compelled to keep troops in that neighbourhood. The transport of troops by the Allies has been already referred to (art. 2).

The war of 1859. France and Italy had the superiority at sea, French troops were sent by sea to Italy, and Austrian ports were blockaded.

The war of 1866. The Italians were defeated at sea by the Austrians but too late. The war was quickly decided on land.

The American Civil War 1861—64. In this great struggle the Federals, having a navy, were able not only to transport troops to various points on the coast and to send ships up the rivers to co-operate with their land forces, but to effectively blockade the ports of the Confederates and prevent the Confederate armies from obtaining essential supplies. In spite of the achievements of the Alabama and other blockade runners, the effect of the blockade on the result of the war was very great. The fact that the Confederates, getting a few cruisers, let them loose on Federal trade did not appreciably alter the course of the war.

Arabi Pasha's Rebellion in Egypt, 1882. British ships bombarded the forts at Alexandria, and silenced them, although the British gunnery was extremely bad. Sir Percy Scott states that this did not impel the Admiralty to improve the system of gunnery training.

The Civil War in Chile in 1891. In this war the

navy was on the side of the Congressionists who took the ships to the northern part of the country, formed an army and — obtaining supplies from abroad — transported the army to the south where it gained the victory.

The Chino-Japanese War of 1894. The fighting was in Korea and both combatants had to send forces there by sea. In a preliminary engagement off Phang Island on 25th July between three Japanese light cruisers and two Chinese ships of the same class, one of the latter was sunk and one escaped to Wei-hai-wei. A transport with 1200 Chinese troops on board was ordered by the Japanese to follow them but the Chinese prevented the officers from complying and the vessel was sunk by the Japanese, *most of the troops being lost.*

On 17th September the Chinese fleet, after escorting transports and landing troops, was returning to Taku when it was met near the Island of Hai-Yang by the Japanese squadron. The Chinese fleet consisted of two battleships — each carried four 12-inch guns — and nine cruisers. The Japanese had nine cruisers, of greater size and speed than those of their enemy, and one small battleship. The Chinese line had the strongest ships in the centre. The four fastest Japanese cruisers, formed into a flying squadron, bore away to attack some torpedo boats and other vessels which were coming in to join in the fight. It was soon recalled. The main body of the fleet and the flying squadron, each acting independently, circled round the Chinese fleet and concentrated their fire on selected ships. Four of these — all cruisers — were sunk by gunfire. The rest of the Chinese fleet escaped to Port Arthur except one which ran ashore. This action gave full command of the sea to the Japanese and enabled them to successfully finish the war on land.

The Spanish-American war of 1898. In this war half-a-dozen Spanish ships, mostly cruisers of about 1000 tons each, lying in the harbour of Manilla, were attacked on 1st May 1898 by a United States squadron of ships of similar kind and number but of greater size and gun-power. The Spanish ships had just been to Subig and had returned because of the absence of the mounted guns which the Admiral had expected to find there. At Manilla they were supported by a few shore guns. There were six in the battery but only three could be fired in the proper direction. The American ships cruised up and down as they fired, the range varying from 5,000 to 2,000 yards. Two of the Spanish ships broke into flames and all were sunk or destroyed. The American ships suffered no appreciable damage and their casualities were seven men wounded.

The main body of the Spanish fleet crossed the Atlantic and the United States fleet spent some time in looking for it. Scouting could not be properly effected with the few ships suitable for this purpose which the Americans possessed. The fleet was eventually discovered in the harbour of Santiago, in Cuba. An ineffective attempt was made to block the narrow entrance to the harbour by sinking a collier. The American ships blockaded the harbour and an American army was transported across the sea to Cuba. On 3rd July the Spanish ships — three cruisers and two torpedo boats — were seen coming out of the harbour. A United States fleet consisting of four battleships, a cruiser and some small vessels, was waiting for them and at once opened fire. The Spanish ships were sunk or run ashore in flames. Their losses were 353 killed and 151 wounded. The American loss was one man killed. Previously to this the Americans had engaged the batteries at Santiago and proved them to be weak. They declined to risk their ships by sending them

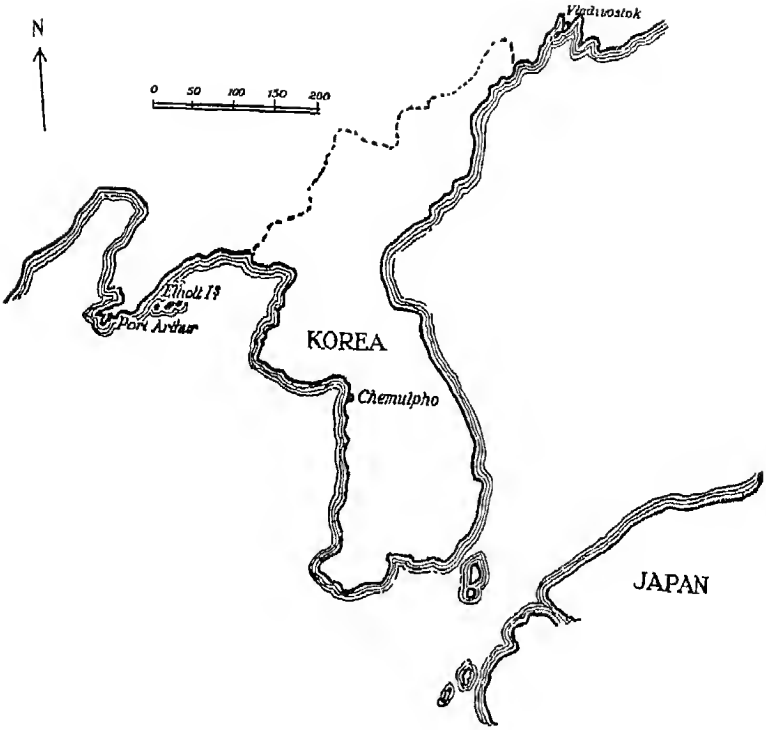
into the harbour. There might have been mines and there was no great need for hurry. The victory gave the command of the sea to the Americans who forthwith transported more troops to Cuba and finished the war. As stated by Mahan a million men would have been useless without the command of the sea.

In both the above ship engagements the Spanish ships were hopelessly out-classed but want of preparation, lack of morale and bad gunnery all helped to contribute to their disasters.

One of the causes of the war was the blowing up of the United States battleship Maine while lying in the Spanish harbour of Santiago. Subsequent examination showed that the explosion was external.

During the war some coaling at sea was accomplished. Also a "naval incident" occurred. In Manilla Bay there lay an American and also a German squadron. The relations between the two countries were strained. The United States had established a blockade at Manilla Bay and the ignoring, by the German Admiral Von Diederichs, of the blockade rules, increased the strain. The American squadron was commanded by Admiral Dewey. No-one would have been very much surprised if the two squadrons had opened fire on one another. Just then Captain Chichester — afterwards Sir Edward Chichester, Bart., — who was in command of a British man of war and was aware of the state of affairs, steamed in between the two squadrons and dropped anchor. Neither side could have fired without the risk of sinking his ship. Neither side fired and soon afterwards better relations prevailed, Captain Chichester having been instrumental in smoothing matters down.

Art. 6. The Russo-Japanese war, 1904—1905. *The Earlier Operations.* In this war the chief object of the Japanese was to oust the Russians from Port Arthur.


N
0 50 100 150 200
Vladivostok
Elliott I?
Port Arthur
KOREA
Chemulpho
JAPAN

The Russians had at Port Arthur a squadron which included 5 battleships and 5 cruisers. They had 3 cruisers at Vladivostok and one object of the Japanese was to prevent these from joining the Port Arthur squadron. The Japanese navy included 6 battleships, 8 large cruisers and some 14 small cruisers. The Russian battleships averaged about 13,000 tons each, the Japanese nearly 15,000 tons. All were of the pre-Dreadnought type, each carrying four 12-inch guns. The Russian cruisers were mostly of medium size but two of those at Vladivostok were very large. For the Japanese to carry on the war it was essential for them to transport troops from Japan to the mainland.

Under the above circumstances there might have been expected from the Russian navy energetic measures and hard fighting. What actually happened affords — to any friend of Russia — but dismal reading. On the 3rd February 1904 the Russian ships had passed through the narrow entrance of the harbour of Port Arthur and, after making a very short cruise and returning, lay in the outer roads under the shelter of their shore guns. On 6th February the Japanese government broke off negotiations with Russia but it appears that the Russian naval commanders were not promptly apprised of this. On the night of 8th February, Japanese destroyers surprised the Russian ships and, by means of torpedoes, seriously damaged the battleships Retvisan and Tsarevitch and the cruiser Pallada. They then made off. The Russian torpedo nets were not out. The damaged ships were taken into the harbour. There was a dock for the Pallada but none big enough for the battleships. These had to be beached and "coffer-dams" built round them to enable repairs to be effected. The rest of the Russian fleet cruised on the 9th February and had a skirmish — receiving some damage — with the Japanese ships

but did not succeed in drawing them, as it returned to Port Arthur, under the fire of the shore batteries.

Meanwhile, Japanese transports under cruiser escort had sailed for Korea. Arriving off Chemulpho on 8th February they found there the Russian cruiser Varyag and the gunboat Korietz. These came out, fought for half an hour at a 6-mile range, retreated into the harbour and were scuttled by their crews. The Japanese sent more transports to sea. Establishing a base at the Elliott Islands they set up a blockade of Port Arthur and maintained it doggedly.

On the night of 12th April, a large number of Japanese destroyers laid mines off Port Arthur and sank a Russian destroyer. Next morning Japanese cruisers arrived off the port. The Russians were now under a competent leader, Admiral Makaroff, one who did not let the ships lie in the harbour but made frequent cruises. He took out his ships — 3 battleships and 4 cruisers — to attack the Japanese cruisers. These led him towards the minefield. The Russians crossed it without mishap. Sighting Japanese battleships under Admiral Togo they retired towards Port Arthur. The Petropaulovsk, striking a mine, sank with all on board including the gallant Admiral.

On the night of 2nd May the Japanese succeeded — they had twice before failed — in taking some old merchant ships into the entrance of Port Arthur and sinking them there. The work was done in tempestuous weather and the ships were subjected to gunfire and torpedo attack. Not all of them got into the entrance and on these the casualities were heavy. Japanese destroyers, braving the storm, rescued some of the crews.

In May the Japanese battleships Hatsuse and Yoshima struck mines and were lost. In the same month the Russian cruiser Bogatyr was lost by running on a rock.

The Japanese continued to transport troops to the mainland. They landed 10,000 men on some mud flats, the men having to wade for half-a-mile, without the landing being opposed.

The obstructions at the entrance to Port Arthur were in due course removed by the Russians. The Japanese kept up a steady blockade. It was vital for them to destroy the Russian ships. They waited for them to come out or to be driven out by the shore guns as the the Japanese army advanced. The damage to the three Russian ships, torpedoed at the beginning of the war, was made good. Before the end of June the whole of the Russian ships came out, made a short cruise and returned to port. By the end of the first week in August the Japanese shore guns could fire on the ships in the harbour. This fire, on 10th August, brought the Russian ships out, 5 battleships and 4 cruisers. They were attacked by 4 Japanese battleships and 14 cruisers. The Tsarevitch, badly damaged, fell out of the line and the Admiral, Vithoff, was killed. Most of the Russian ships ran for Port Arthur but the cruisers had scattered, the Novik being destroyed after a long chase and others having to run for neutral ports where they were interned. The guns from the ships at Port Arthur were mounted by the Russians as shore guns and the ships scuttled. The ships thus dealt with were the battleships Retvisan, Poltava, Pobieda and Peresviet and the cruisers Pallada and Bayan. All were subsequently raised by the Japanese and added to their navy.

The Russian cruisers at Vladivostock were the Gromoboi, Rossia and Rurik. They came out now and then. In April and June they sank or drove ashore three Japanese transports full of troops. On 14th August they were chased by a Japanese squadron. The Rurik, set on fire by the Japanese shells, was scuttled by her crew. The other two ships though damaged got away.

The great cause of the Russian failures in the above series of operations was want of leadership. It has been said that if Makaroff had lived matters would have gone differently. There was also lack of knowledge, preparation and foresight. In the Port Arthur roads on 8th February, the increased power of the modern torpedo was not allowed for and — as already mentioned — the nets were not out and there was no dry dock for the battleships. That the gunnery was inferior to that of the Japanese was made clear at the battle of the 10th August. Want of training is proved by the fact that the Russian ships were not in the habit of passing through the entrance to Port Arthur under their own steam. They were towed by tugs and it took them hours to come out. But above all there was the unwillingness to risk the ships in battle at sea. All this may be contrasted with the Japanese alertness, initiative, seamanship and readiness to fight. The Russian squadron off Port Arthur on 10th August — if not the Varyag and Korietz at Chemulpho in February — should at all costs have disposed of a part of the Japanese navy. The Baltic fleet which subsequently arrived might then have disposed of the rest.

On the 2nd January 1905 Port Arthur surrendered. Its defences had never been properly completed for want of funds.

The Battle of Tsushima. When the Russians lost the battle off Port Arthur on 10th August 1904, they began to get ready a fresh fleet in the Baltic. In April 1905 it was ready and put to sea under Admiral Rozhdesvensky. In passing through the North Sea it fired on some British fishing boats — which were mistaken for torpedo boats — and some casualities were thus caused. An enquiry was subsequently held and the matter was settled. The progress of the fleet was slow

owing to many breakdowns. Coal was obtained from neutral ships. Colliers and store ships accompanied the fleet. On 27th May 1905 the fleet arrived in the Straits of Tsushima and was met by the Japanese fleet under Admiral Togo. At this period the usual type of battleship was the one carrying four 12-inch guns — two in the forward and two in the after turret — and about a dozen 6-inch guns. Of such battleships the Russians had six, the Japanese four. The Russians also had the Osliabya which was similar to the above except that the big guns were 10-inch. The Japanese battleships had an advantage in speed and thickness of armour.

The Russians had altogether 18 ships arranged in 4 squadrons. The ships were in the order named below:

First squadron, 4 battleships, Kniaz Souvaroff, Imperator Alexander III, Borodino and Orel, each of 13,516 tons, speed 18 knots.

Second squadron, 3 battleships, Osliabya, Sissoi Veliky, Navarin, 10,000 to 12,600 tons, and 1 armoured cruiser Admiral Nakhimoff, 8,500 tons, 8 guns (8-inch); speeds of all 16 to 18 knots.

Third squadron, 1 battleship Imperator Nikolai I, 9,670 tons, 2 guns (12-inch); and 3 coast defence ships, General Admiral Apraxime, Admiral Seniavin, Admiral Oushakoff, each of 4,000 to 5,000 tons and 4 guns (9-inch); speeds of all 4 ships 15 to 16 knots.

Fourth squadron, 6 cruisers, "protected" or armoured, 3,200 to 6,700 tons, generally about 6 guns (6-inch), speeds 15 to 20 knots.

The ships of the second and third squadrons had secondary 6-inch guns, about 8 and 4 per ship respectively.

The Russians had also two 23-knot cruisers, the Izumrud and Jemtchug, each of 3,100 tons and each carrying 6 guns of 4.7 inches. These two ships were present at the meeting of the fleets but were out of the line.

The Japanese had in their line 12 ships arranged in 2 squadrons, in the order named below.

First squadron, Mikasa, Shikishima, Fuji, Asahi, averaging about 14,000 tons, speeds 18 to 19 knots; 2 armoured cruisers of 7,300 tons, 8-inch guns (3 and 4 respectively) speeds 20 knots.

Second squadron, 6 armoured cruisers, each of about 9,700 tons with 4 guns (8-inch) and speeds 21 to 23 knots.

All the 8 armoured cruisers had secondary 6-inch guns, 12 to 14 per ship.

The Japanese had also 15 protected cruisers of 2,500 to 5,000 tons, speeds 16 to 23 knots, the guns varying from a few of 4.7 or 6 inches to 1 of 12.6 inches with a dozen of 4.7 inches. These 15 ships were not at first in the battle but were sent round to attack the Russians in rear.

The Russian squadrons were mostly of low speed to begin with and were in worse plight after completing a long voyage. They were over-loaded with coal. Those in command were unskilled in manoeuvring. When met by the Japanese they were not all in line ahead but in two parallel lines, the 1st squadron being on the starboard side of the 2nd, which was followed by the 3rd and 4th. The Japanese had their two squadrons in line ahead.

The positions of the aproaching fleets at 1.45 p. m. were as shown at A and B in Fig. 12. Both sides opened fire. The Japanese swerved as though to go west but immediately swung round to the east and, though the Russians also altered course to north-east, the Japanese manoeuvre was nearly a crossing of the T, the positions of the ships becoming at 2.10 p. m. as shown at C and D. The Japanese gunnery was superior to that of the Russians. Very early in the battle the two Russian battleships at the heads of the lines, the Souvaroff and

the Osliabya, were badly hit and on fire and fell out of the lines. The Russian ships appear to have steamed slowly and kept the enemy on their port bow. The Japanese used broadside and manoeuvred. The Russian ships could not manoeuvre and must have got in one another's way. By 2.5 p. m. the Imperator Alexander III, also badly hit and on fire, had fallen out of the line. The battle had now been almost decided.

At 3 p. m. the position was again somewhat as shown at C and D in Fig. 12. The Russians tried to break away to the north and pass behind the Japanese ships. The latter turned to the north-west in the manner described in art. 3 and illustrated by Fig. 11. The Russians were headed off and turned eastward. About this time Rozhdesvensky was wounded. At 3.10 p. m. the Osliabya sank. The Japanese armoured cruiser Asama, last ship but one in the line, struck by three shells, had also to fall out but soon repaired damage and returned. The Russians attempted to break away to the east but the Japanese repeated their manoeuvre. After this there was much confusion, the Russians — with some ships on fire — enveloped in smoke, the Japanese steaming round them and firing. The smaller Japanese ships, sent round earlier in the day, attacked the Russian rear. The Russians broke away to the north but were pursued. Some of their slower ships were left behind and cut off. In the evening there was mist. As darkness fell the Japanese ships made room for torpedo craft to come into action.

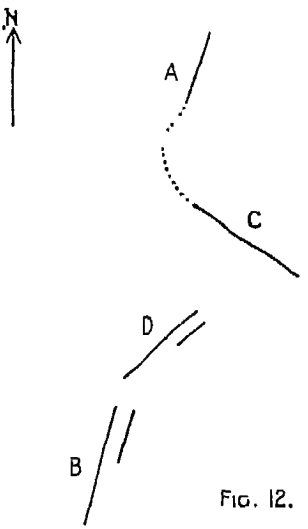


FIG. 12.

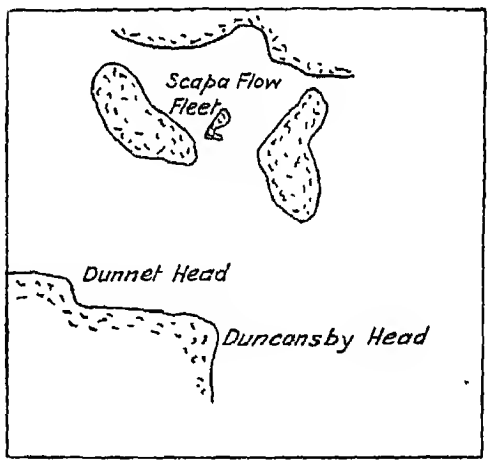
At daybreak the remaining Russian ships again fought but soon they had nearly all been sunk or, surrounded by Japanese ships, surrendered. Only a few escaped.

The Russians at Tsushima fought under great disadvantages. A Russian officer Captain N. Klado, writing concerning the battle, states that the Russian fleet was in no way prepared for war and had no competent Admiral. There was, as before, indifferent gunnery, and the morale must have been seriously affected by the long series of defeats at the hands of the Japanese.

CHAPTER VI.

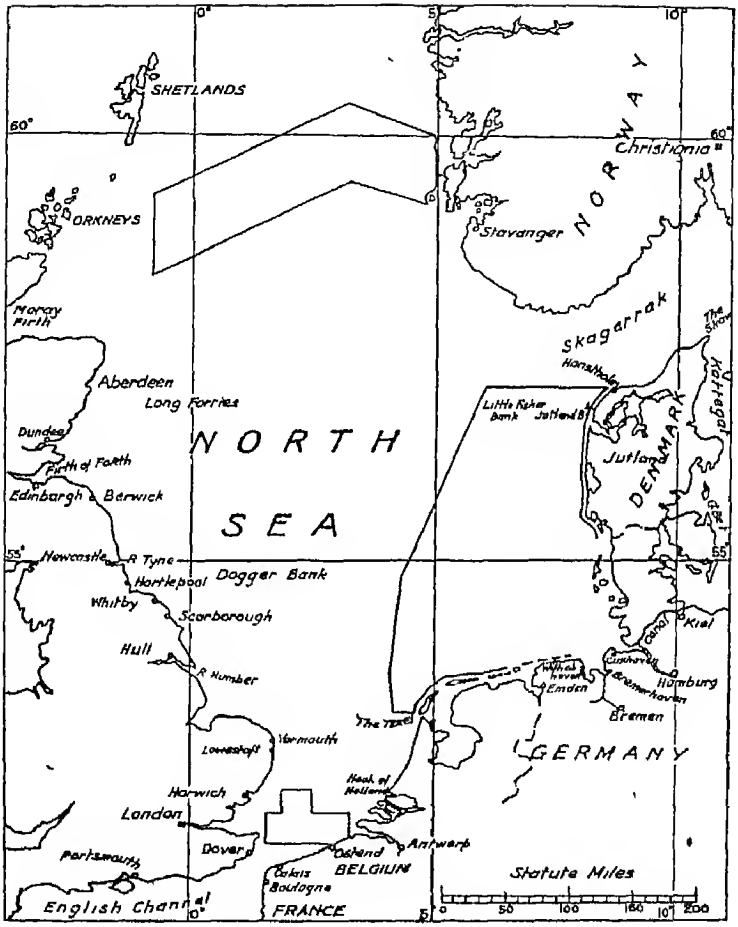
THE GREAT WAR.

Art. 1. General Sketch. The Grand Fleet lay at Scapa Flow in the Orkneys. Its cruisers covered the seas across to Norway. It had hurried north before war was declared. If Germany, striking before a declaration of war, had seized a base in the Orkneys or Shetlands what would have prevented her from sending out commerce-raiding ships to all the oceans? As it was only one got out, hugging the coast of Norway.



Scapa Flow had been selected as a base by Lord Fisher, a few years before. German destroyers from Heligoland could not get there and back at full speed. The area of the harbour is some fifty square miles. The accompanying illustration shows a rough sketch of it.

Germany had decided not to weaken her High Seas Fleet by attacks on Russia in the Baltic. Nor did she venture to bring it out to fight the stronger British Fleet. She kept it behind her defences in the North Sea.


0°
5°
10°
60°
SHETLANDS
ORKNEYS
NORWAY
Christiania
Stavanger
Skagarrak
Moray Firth
Aberdeen
Long Forties
Dundee
Firth of Forth
Edinburgh
Berwick
NORTH SEA
Little Fisher bank
Jutland
DENMARK
Jutland
Holland
Kiel
Canal
Newcastle
R Tyne
Hartlepool
Dogger Bank
Whitby
Scarborough
Hull
R Humber
Emden
Hamburg
Bremen
GERMANY
The Texel
Yarmouth
Lowestoft
Harwich
London
Dover
Portsmouth
Ostend
Antwerp
Calais
Boulogne
BELGIUM
FRANCE
English Channel
Statute Miles
0
50
100
150
200

Her policy was to wear down the British Fleet. She relied mainly on mines and submarines.

At first she had expected that the British Grand Fleet would make a great attack in order to destroy her fleet. Her scouts could see nothing of the Grand Fleet and the Germans were puzzled. Germany's bases were Wilhelmshaven, Bremerhaven and the estuary of the Elbe. In Heligoland also she had an outlying base magnificently equipped and fortified.

Great Britain's object was to protect her commerce, to stop Germany's commerce, to defend her own coasts from attack and invasion, and to ensure the safety of the transports carrying her troops and their supplies across the seas. The cruisers, based on Scapa Flow or Rosyth, made frequent sweeps into the North Sea. Any German craft coming out could never be sure that they would not meet them. Patrol areas were established in the north part of the North Sea, and watched by cruiser squadrons — fast to reduce risk from submarines — to stop German ships from raiding our coasts or transports, or from making for the ocean; and to prevent traffic in contraband. Generally the patrolled areas or lines watched were duplicated and so arranged that any ship must pass one or the other of them during daylight. Light forces — destroyers and submarines with a few light cruisers — based on the Nore, on Harwich, on the Humber, on the Tees, on the Tyne, patrolled and defended the coasts. There were, before long, over a hundred lesser naval bases. The Dover Patrol — famed force — protected the transports crossing the Straits. West of the Straits was a squadron of old battleships. Any strong and heavy force brought southwards by the Germans to attack the transports would have been caught by the Grand Fleet before it could get back. The Grand Fleet itself made occasional sweeps through the North Sea.

Some French cruisers and destroyers co-operated with the British in the Channel and the Straits of Dover. All the rest of the French Fleet was in the Mediterranean Great Britain also kept a strong force there.

Great convoys of troops from Canada, Australia, New Zealand, India and South Africa crossed to England, to France, to Mesopotamia, to Egypt, to Gallipoli, to Salonika, to East Africa. French troops streamed across from Algiers to France. To all ships on distant seas the Admiralty sent information and instructions by wireless or cable. At the outbreak of war the German ocean cables had all been cut by the British.

The state of affairs above described continued — except for modifications which will be mentioned, unless obvious — throughout the whole of the fifty-one months of war.

Great Britain, on account of her vast trade and scattered possessions, had, at the outbreak of war, a great number of cruisers. Many were, as usual, distributed about the world on the West Atlantic, China, Australian, New Zealand, East Indian, Cape and South American stations. More were sent out. Germany had some cruisers at Kiaochao her sole over-sea base. These and some auxiliary cruisers did much damage to British shipping but were soon destroyed or driven off the seas.

At the outbreak of the war, Germany, Russia, Italy and Austria had large numbers of mines ready. Germany at once began laying them not only in her own waters including the area around Heligoland, but on the high seas without any notification of their position such as is required by international law. The sweeping up of mines by both belligerents went on continuously on a great scale.

In order to prevent German submarines from getting out into the channel, the Straits of Dover were mined. Similar measures were taken, later, in the North Channel

between Scotland and Ireland. Across the Straits of Otranto, at the southern entrance to the Adriatic, a barrage of nets was constructed.

Germany, from the commencement of hostilities disregarded the rule that mines must be so constructed as to become harmless if they break adrift. Mines caused many losses of warships and merchant ships. The 20th destroyer flotilla was specially employed on mine-laying. Great numbers of mines were laid at night. The boundaries of three large areas mined by the British — and duly notified to mariners — are shown on the accompanying chart, reduced from an Admiralty chart of the North Sea. The boundaries of the two southern areas were revised once or twice and freshly notified. One of the chief objects was to hinder German submarines coming from German or Belgian bases into the Channel. The area adjoining Denmark, Germany and Holland includes of course areas mined by the Germans. The territorial waters of Denmark and Holland were left free. The area between Norway and the Orkneys was mined in 1918 as one of the anti-submarine measures (Chap. VI. art. 5).

In October 1914, mines were found in the sea off the North of Ireland in such circumstances as to make it appear to the British Admiralty that the mines could only have been laid by a neutral ship, or by one pretending to be neutral. The battleship Audacious (art. 2) was sunk by such a mine. The British Government promptly notified that certain parts of the North Sea, and of the sea to the north of Ireland, were a military area and closed to shipping, and that ships could only traverse it at imminent risk. The exact boundaries of the closed area were notified and arrangements were made by which merchant ships could obtain sailing directions and so be able to complete their voyages. They could of course be searched according to old usage.

In March 1915, the British and Allied Governments arranged to prevent goods of all kinds from leaving or entering Germany by sea. The "long distance blockade" then set up has been already discussed and also the disputes which it caused with neutral countries and it has been shown that the procedure adopted was in accordance with the accepted principles of international law. The blockade involved the examination of countless ships, and in all weathers. The Baltic ports of Germany were not blockaded because the Allies had not the command of that sea but British submarines for a long time greatly interfered with the German Baltic trade. The general blockade of Germany continued throughout the war.

There was, as will be seen, a pendulum-like swing of great losses of warships — as between the Allies and the Central Powers — but the British had ships in many seas while the enemy did not often venture far out. It was thus inevitable that the British losses of big ships should far exceed those of the enemy.

As a further means of wearing down the British Navy, Germany made raids on various British coast towns, and her ships at the same time sowed mines. The raiding ships sometimes had to fight. The Heligoland Bight and the German harbours on the Belgian coasts were frequently raided, often with success, by the British, the French sometimes co-operating.

The sinking by German submarines of British and Allied merchantmen, commencing early in the war, in the waters around the British Isles, became of increasing seriousness as time went on. It extended to the Mediterranean and out into the Atlantic and included neutral merchantmen trading with Britain or her Allies. Known as the "Submarine Campaign" and carried on in circumstances of the utmost barbarity it became at last of transcendant importance. It gravely threatened

the food supplies of the British Isles. It was met by vigorous anti-submarine measures and by strenuous ship-building. In 1917 it brought in the United States on the side of the Allies and this enabled the war on land to be terminated.

British submarines attacked German ships of war and merchantmen in the Baltic. They sank the merchant ships after the crews had been taken off. They also played a great part in Turkish waters. Italian and French submarines operated in the Adriatic and Ægean Seas. British ships co-operated with Italian ships in the Adriatic and, later, attacked the Bolshevist ships in the Baltic.

Thus — besides the blockade of Germany — a main characteristic of the naval war, as regards the fighting ships, was a large number of separate attacks, sinkings or fights, many attaining to the status of battles; and an immense number of attacks — largely successful — on merchantmen. But there were also several great independent operations. The chief of these were, in 1914 the short but highly successful naval attack on the flank of the German army in Flanders; in 1915 the attempt — unsuccessful, though it kept the Turkish land forces occupied and prevented their operating elsewhere — to force the Dardanelles in order that an Allied Fleet might reach Constantinople. In this attempt the Dardanelles forts were bombarded by the warships of Great Britain and France. Landings of troops in Gallipoli were effected under unexampled conditions with the aid of British warships. Heavy toll of these ships — British and French — was taken by German, Austrian and Turkish submarines and, in the narrow waters, by Turkish mines, torpedoes and shore guns. In 1916 was fought the great naval Battle of Jutland Bank when the Grand Fleet at last met the High Seas Fleet, a

battle which, though it drove the latter into harbour, was in more ways than one disappointing to Great Britain.

The naval events of the war were unexampled in scale and in importance. The greatest work by far, on the side of the Allies, fell to the lot of the British Navy, but the navies of France, Italy, Russia, The United States and Japan all co-operated. The responsibility of the Admiralty was enormous. A decision regarding the attack on the Dardanelles had to be made while the dire threat of the submarine campaign was impending. One post-Dreadnought battleship had been sunk. Two others — the Conqueror and Monarch — were for a considerable period disabled owing to their colliding when entering Scapa Flow in the dark. The new battleship Queen Elizabeth stripped the blades of one of her turbines. Accidents like these were not heard of by the public at the time. The task of the Allied fleets, and especially the British, in convoying troops and supplies to all the theatres of war was stupendous. The number of transports sunk by the enemy formed a very small proportion of the whole.

The British state of unpreparedness for the war has been mentioned by Lord Jellicoe and others. At the outbreak of war the British were short of fast light cruisers, destroyers, submarines, mine-sweepers, patrol craft and mines. The mines were not of the best. There was no harbour on the East Coast properly protected against submarines. Sir Percy Scott ("Fifty Years in the Royal Navy") has attacked the Admiralty system of working, stating that it leads to the shirking of responsibility and the avoidance of coming to decisions. He instances cases of appalling delay, e. g. two years delay in the provision of depth charges.

On the other hand it has been pointed out by Rear-Admiral Sir Alfred Chatfield at a meeting of the Insti-

tution of Naval Architects, that the Construction Department of the Admiralty designed the Dreadnought, the battle-cruiser, the present type of light cruiser, the modern destroyer, the first surface submarine and the modern idea of torpedo protection, and has led the way in the armament of capital ships with great effect. It has possessed in a high degree imagination, initiative, resource and boldness. Complaints have been made of the "censoring" of despatches but the Admiralty probably had good reasons for all they did in this way.

During the war an enormous amount of building of ships of war — and conversion of ships into ships of war — was carried out by Great Britain and a large amount by Germany. Fast liners were converted into auxiliary cruisers, and trawlers and drifters into minesweepers. Great Britain built the Hood, Courageous, and Glorious (Chap. III. art. 5) some big aeroplane carriers and mine-layers and many large monitors, light cruisers, destroyers, submarines and minesweepers. The destroyers and submarines were fitted to lay mines. While the building was going on a vast auxiliary fleet was formed from the trawlers and drifters and small craft. Yachtsmen, fishermen and mercantile marine all flocked to the White Ensign.

The numbers of big ships which were engaged in the war were as follows. The list does not include auxiliary cruisers. It includes the ships of the regular navies both those which were in existence when the country concerned entered the war and those which were completed during the war. The war, so far as Russia as an Ally is concerned, ended in 1917.

The statement on pp. 150—151 shows the losses of big ships during the war. The losses shown as by mine, submarine or torpedo do not include any which occurred in battles or fights. In some cases it is not easy to draw the

line between a loss in a fight and one by torpedo or after damage. Losses in battle were nearly always from gunfire. The whole statement of losses, together with the figures for smaller ships given on page 149, give a good indication of the nature of the war.

	Great Britain	France	Italy	Russia	U.S.A.	Japan	Germany	Austria-Hungary	Turkey	Total
Recent Battleships	35	7	6	8	16	4	20	4	—	100
Battle Cruisers	12	—	—	—	—	4	6	—	1	23
Pre-Dreadnought Battleships	40	22	8	11	19	13	20	12	3	148
Cruisers	47	24	9	14	13	14	8	3	3	135
Light Cruisers	99	15	23	7	14	25	50	9	—	242
Monitors	36	—	3	—	4	—	—	—	—	43
Aircraft Carriers	4	—	—	—	1	—	—	—	—	5

Out of the 100 recent battleships only 8 were lost. The battle fleets were well protected and seldom met in battle. The losses by mine included the Audacious. Of the losses no less than 5 were from explosion, the British ship being the Vanguard. The Japanese also lost a battle cruiser from explosion. The dangers to big ships in war are not confined to those which keep the seas. The other battle cruiser losses were all at Jutland Bank.

Of the old battleships, the British ship lost by explosion

was the Bulwark. The British losses in battle were at the Dardanelles, the ships being sunk by mines which drifted down on them with the current. The Russian loss in battle was in the Gulf of Riga, the German at the battle of Jutland, the Austro-Hungarian loss occured in harbour.

Of the cruiser losses in battle the 5 British losses occurred at Coronel and Jutland, the 3 German at the Dogger Bank (1) and the Falklands (2). The British loss from explosion was the Natal.

The battle losses of the German light cruisers occurred at Heligoland (3), the Falklands (2) and Jutland (4). In the case of the ships shown as lost after damage, the injury was caused by torpedo, gunfire or collision, and the ship was blown up by her captain (2), driven ashore and interned, (1) or paid off as unfit for further service (2).

Only 3 monitors were lost (2 British, 1 Italian) and one British aircraft carrier.

The losses of destroyers and torpedo boats amounted to 256 of which 72 were British, 18 French, 12 Italian, 10 Russian, 3 Japanese, 2 United States, 122 German, 10 Austro-Hungarian and 7 Turkish. The losses — stated approximately in order of importance — were caused by mines, collisions or wrecking, in battles or fights, by submarines, capsizing or other accidents.

The losses of submarines were over 300. Of these 54 were British, 14 French, 8 Italian, 7 Russian, 10 Austro-Hungarian, 2 Turkish and 210 German. Of the German vessels about 200 were sunk by the Allies during the war and 10 disappeared after the armistice, a few being lost and the rest sunk by the Germans. For details concerning those sunk by the Allies see Chapter III, art. 9.

It was early in 1917 that the danger to Great Britain from the submarine campaign reached its height. By

		By Mine	By Submarine	By Explosion	By Torpedo	In Battle	By Wreck	Sunk as block ships	Lost after damage	In fight	By Collision	Total
Battleships	Great Britain . . .	1		1								2
	Italy	1		1								2
	Russia			1								1
	Japan			1								1
	Austria-Hungary .			1	1							2
	Total	2		5	1							8
Battle Cruisers	Great Britain . . .					3						3
	Germany					1						1
	Japan			1								1
	Total			1		4						5
Pre-Dreadnought Battle-ships	Great Britain . . .	2	5	1	1	2						11
	France	1	3									4
	Italy			1								1
	Russia	1				1						2
	Germany					1						1

	Austria-Hungary .				1							1
	Turkey		2									2
	Total	4	10	2	2	4						22
Cruisers	Great Britain . . .	1	5	1		5	2					14
	France	1	4									5
	Italy		2									2
	Russia		1									1
	U. S. A.	1										1
	Germany	2	1			3						6
	Total	5	13	1		8	2					29
Light Cruisers	Great Britain . . .	3	3					5		1		12
	Russia									1		1
	Japan				1		2					3
	Germany	1		1	5	9			5			21
	Austria-Hungary .									2		2
	Total	4	3	1	6	9	2	5	5	4		39
Flotilla Leaders	Great Britain . . .		1			1					1	3
	Grand Total . . .	15	27	10	9	26	4	5	5	4	1	106

increased anti-submarine measures, in which America participated — the Japanese were already assisting in the Mediterranean — the damage done was gradually reduced and when, in 1918, about two million American troops had been brought in convoys across the Atlantic — some 60 per cent of them in British ships — and the land war had turned decisively in favour of the Allies, the submarines were probably being sunk more quickly than they could be built. The final event of the naval war was the surrender of the German fleet.

The tremendous sea traffic of the war — transport of troops, munitions of war and supplies of all kinds — showed once more the meaning of sea power. No country can now be called a Great Power which has not a strong navy.

Lord Fisher had a plan for sowing the North Sea with mines to such an extent that navigation in it would be impossible, for then taking the British fleet into the Baltic, overwhelming the High Seas Fleet, and landing an army on the coast of Frisia or Schleswig. He had also a scheme for landing Russian troops in Pomerania. Many of the ships built during the war, including the Great Cruisers, were mainly intended for the above schemes. The Germans were afraid of these schemes though they did not know of the proposed mining. They thought that the British would try to destroy the High Seas Fleet in the North Sea. They would not weaken it by detaching any ship from it for the Baltic. The Dardanelles operations (art. 4) spoilt Lord Fisher's scheme.

The succeeding articles contain more detailed information as to the most important events of the war.

Art. 2. Early operations. *The first fights.* On the evening of 4th August 1914 the German mine-laying cruiser Königin Luise came across to lay mines off the Thames estuary. On the 5th she was sunk by the British

cruiser Amphion and other ships. The Amphion, striking one of the newly laid mines, was herself sunk. Ten German U-boats were sent out to attack British ships suspected to be about to operate near the Skagerak. They went some 300 miles northward. Two were sunk, one of them being rammed by the cruiser Birmingham.

Three hours after the outbreak of war, submarines "proceeded unaccompanied to carry out a reconnaissance in the Heligoland Bight. They returned with useful information, and had the privilege of being the pioneers on a service which is attended by some risk."

"During the transportation of the Expeditionary Force the Lurcher and Firedrake and all the submarines of the 8th submarine flotilla occupied positions from which they could have attacked the High Sea Fleet had it emerged to dispute the passage of our transports. This patrol was maintained day and night without relief, until our Army had been transported and all chance of effective interference had disappeared" (Extracts from despatch of Commodore Roger Keyes).

On the 14th September, E. 9 torpedoed and sank the German light cruiser Hela six miles south of Heligoland. A number of destroyers were evidently called to the scene after E. 9 had delivered her attack, and these hunted her for several hours. On the same day the same submarine examined the outer anchorage of Heligoland, a service attended by considerable risk.

In the same month a German submarine entered the Forth and passed under the bridge but was driven off.

The Goeben, a German battle cruiser of 22,600 tons, accompanied by the light cruiser Breslau of 4,500 tons, was at the outbreak of war in the Mediterranean. On the 5th August they were at Messina. Four British cruisers of the Defence class under Rear-Admiral Troubridge, were watching for them off Cephalonia. Other ships in-

cluding two battle cruisers under Admiral Sir Berkeley Milne, were watching off the coast of Sicily. The Admiralty kept them informed of what they knew but the German ships, escaping from Messina on 6th August, ran for the Dardanelles — the Gloucester, a cruiser of 4,800 tons, pluckily following and firing on them until she was recalled — and took shelter in the waters of Turkey at that time neutral. They were "bought" by the Turkish Government and were named respectively Yavuz Selim and Midilli. The Admiralty, after making enquiries concerning the escape of the ships and holding a court martial on Rear-Admiral Troubridge acquitted both the Admirals of blame.

On 1st November the Goeben — for she was still popularly known by that name — bombarded the town of Sevastopol. On 18th November she was sighted and engaged by Russian battleships, the Sviatoi Evstafi and others scoring many hits on her until she made off. In December she was damaged by a mine. Proper repairs could not be carried out and her speed was considerably reduced. She was then kept in the Bosphorus.

The Battle of Heligoland Bight. "These submarines have since been incessantly employed on the Enemy's Coast in the Heligoland Bight and elsewhere, and have obtained much valuable information regarding the composition and movement of his patrols. They have occupied his waters and reconnoitred his anchorages, and, while so engaged, have been subjected to skilful and well-executed anti-submarine tactics, hunted for hours at a time by Torpedo Craft and attacked by gunfire and torpedoes."

The above extract from the despatch of Commodore Keyes describes the submarine scouting which preceded the battle. At nightfall on the 27th August 1914, eight British submarines of the 8th Flotilla took up the posi-

tion assigned to them some 40 miles to the west of Heligoland. At daylight on the 28th they exposed themselves in order to induce the enemy to chase them westward but no success attended this manoeuvre.

The light cruisers Arethusa (Commodore Tyrwhitt) and Fearless with a large number of destroyers followed, as arranged, early on the 28th. They were speedily engaged with numerous German destroyers and torpedo boats, and soon afterwards with the light cruisers Stettin and Frauenlob which had been sent out to oppose them. Destroyers accompanying the Fearless sank the German destroyer V. 187. The two boats of the destroyer Defender proceeded to rescue survivors but the destroyers were fired on by a German cruiser and had to abandon the boats. The two German cruisers — one had her bridge wrecked by a shell from the Arethusa — were driven off.

Now appeared the British Light Cruiser Squadron which was in support under Rear-Admiral Christian, then several German light cruisers — one the Mainz was sunk by the light cruisers and destroyers — and last the supporting British Battle Cruiser Squadron under Vice-Admiral Beatty who, apprised of the events and considering that the advanced force was hard pressed, had sent on the light cruisers and followed himself. The Lion sank the Köln and drove another cruiser, the Ariadne, a blazing mass into the mist. The Ariadne afterwards sank, her survivors being taken off by the Stralsund and Danzig. The battle cruisers had, before this occurence, been attacked by enemy submarines but had evaded them.

Submarine E. 4 had seen the sinking of V. 187 and attempted, but without success, to torpedo the cruiser which fired on the destroyers. She then, appearing suddenly out of the sea in the neighbourhood of the abandoned boats, took off the British officers and men

and two prisoners and sent away the rest of the survivors in the boats to Heligoland. While doing this she would have been within easy gun range of an enemy appearing out of the mist.

Of the German destroyers many were damaged. Of the officers and men, some 1,200 in number, on the destroyed German ships, about three-fourths lost their lives and most of the survivors were taken prisoners. No British ship was lost.

In this battle there was considerable confusion. The light cruisers and battle cruisers came unexpectedly and were mistaken for enemy ships. The destroyer Lurcher, on sighting the British cruisers, even sent word that she was being chased by enemy ships. It appears that U-boats off Scapa Flow and the Firth of Forth had reported to the German Admiral Scheer that various British divisions were at sea but that he considered that there was no evidence of combined action or of an attack on the Bight. The battle is an instance of conspicuous success attending good scouting and carefully arranged plans.

The Three Cruisers. The three British cruisers, Aboukir, Hogue, and Cressy, each of 12,000 tons, on patrol duty in the North Sea, were, owing to very bad weather in the third week in September 1914, without their usual attendant destroyers. On the 21st the weather had moderated and the destroyers were to rejoin the cruisers on the 22nd. Before they had rejoined and while the cruisers were patrolling in the "Broad Fourteens" off the coast of Holland, the Aboukir was torpedoed, at 6.25 a. m. by a submarine and quickly heeled over. The explosion was by most attributed to a mine. The Hogue, closing in and stopping to render assistance, was herself struck by two torpedoes and sank in six minutes.

The Cressy, which had also closed in and stopped, was struck by two torpedoes and quickly sank. All watertight doors, scuttles and deadlights were closed when the vessels were struck. Some boats were sent away by the Cressy. Two trawlers and some other vessels came up. A target was cast adrift and was the means of saving many lives. Altogether rather more than a third of those on board the cruisers were saved. The submarine which torpedoed the cruisers was the U. 9 commanded by Weddigen. He afterwards lost his life in the war when in command of the U. 29 which was rammed by the Dreadnought and sunk.

In consequence of the above disaster to the cruisers the British Admiralty issued orders prohibiting any large ship from standing by another which had been torpedoed.

The Four Destroyers. On 17th October 1914 the light cruiser Undaunted, with four destroyers, patrolling in the Broad Fourteens, came upon four German destroyers and sank them all by gunfire. They had been sent to lay mines.

The Two Auxiliary Cruisers. On 14th September 1914 the British Carmania and the German Cap Trafalgar, both very large ships, met in the South Atlantic and fought a great fight. The range had closed to only two miles but the British Captain increased it when he found the enemy ship was reaching him with her smaller guns. After an hour and three quarters the German ship capsized and sank. The Cap Trafalgar was the faster ship and her guns outranged those of the Carmania by 2,000 yards. The German ship was badly handled. The Carmania was set on fire and would have been burnt out had she gone to sea, as some armed liners did,

with the cabins standing. She had been thoroughly stripped of woodwork between decks.

Bombardment of the Belgian Coast. In October 1914, during the great land battle of the Yser, when the German forces were struggling to obtain possession of Calais, the right flank of their army near Nieuport was several times heavily shelled by British naval forces under Admiral Hood. The forces were the cruisers Attentive, Adventure, Foresight and Sapphire, four destroyers, and the monitors Severn, Humber and Mersey. The monitors got in close to the shore. The squadron was reinforced by five French destroyers, and by the old battleship Venerable which guarded the other ships from submarine attack. Balloons were used for observation and for "spotting". The ships were attacked by shell fire and some of the monitors were badly damaged. The work done was of incalculable value. On one occasion the ships fired for eleven hours without cessation. Their fire reached far inland, the German forces being taken in rear and their batteries destroyed. Finally the land was flooded by the Belgians and the Germans abandoned the position.

Events in distant Seas. Early in the war the three British cruisers, Philomel, Psyche and Pyramus, started from New Zealand. On 30th August 1914 they captured the Samoa Islands. They met the battlecruiser Australia and the cruiser Melbourne — both of the Australian navy — and the French cruiser Montcalm. On 11th September New Pomerania was taken and on 24th September New Guinea. All the German wireless stations in the Pacific were taken or destroyed.

Soon after war broke out, Japan with assistance from Great Britain set about to capture the German fortified

harbour of Tsing Tau. There were several forts. In the harbour were an Austrian cruiser — the Kaiserin Elizabeth — and five German gunboats. The waters were mined. Troops were landed some distance away under the escort of the Japanese navy, both on the mainland and on adjacent islands. The harbour and coast were blockaded and the citadel besieged and bombarded. In the bombardment Japanese and British warships took part. The Triumph, one of the older battleships — she had been in reserve at Hong-Kong — quickly silenced the Bismarck forts. German aeroplanes attempted to drop bombs by night on the Japanese ships, but these changed their moorings every night. The Japanese employed mine-sweepers continually and three of them were lost. German warships bombarded the Japanese land forces with little result because of the want of good aeroplane reconnaissances. Tsing Tau surrendered on 7th November 1914, the Kaiserin Elizabeth and the gunboats having been scuttled.

Early in the war the British cruiser Astraea, assisted by the light cruiser Pegasus, bombarded Dar-es-Salam in German East Africa, destroying its floating dock and wireless station. The German light cruiser Königsberg, which had previously escaped from Dar-es-Salam, did some damage to British merchant shipping and on 20th September, at Zanzibar, came across the Pegasus, whose engines were under repair. She shelled the Pegasus which — unable to reply because of the shorter range of her guns — suffered heavy casualities and was sunk.

Later on, the Königsberg, driven by the cruisers Chatham and Weymouth to take refuge in the river Rufigi in East Africa, could not be followed because of the small depth on the bar. In order to bottle her up, the collier Newbridge was sunk in the river, her crew consisting of blue-jackets coming away in her boats, which were fired

on by the Germans from an island, and casualties occurring. In July 1915 the monitors Severn and Mersey proceeded up the river and, assisted by aeroplanes, completed the destruction of the Königsberg by gunfire.

In October 1914 British and French warships assisted a military force which occupied Edea on the river Sanaga in West Africa. They bombarded Victoria and occupied it and subsequently Buea the capital of the German colony.

Raids on Towns. On 3rd November 1914, eight German ships of which three were battle cruisers and the rest cruisers, arrived early in the morning off Yarmouth, shelled the beach and the adjoining sea for some minutes, and then made off. It is said that they did not come very near the English coast for fear of mines and this accounts for their shells falling short. On their way they had met and fired on the British patrol vessel Halcyon — which was considerably damaged — also on two destroyers. As the enemy ships came across they laid numerous mines. Mines were also laid while the bombardment went on. The enemy were pursued by two destroyers and two submarines, one of the latter, the D. 5 striking a mine and sinking. The German armoured cruiser Yorck ran on a German mine in the Jade in the mist and was sunk .

On the morning of 16th December 1914, Scarborough, Whitby and Hartlepool were shelled, the battle cruisers Seydlitz and Moltke and the armoured cruiser Blücher — flying the White Ensign as they approached — attacking Hartlepool and the battle cruisers Derfflinger and Von der Tann attacking Scarborough and Whitby. There were also some light cruisers and destroyers. There was a heavy mist over the sea. The battery was attacked with the biggest guns and there were numerous casual-

ties among the gunners. The battery replied with effect, one shell killing 9 men on the Blücher. The docks, shipyards and gasworks were fired upon by the Germans but received no vital damage. At Scarborough the wireless station and the old castle were shelled, at Whitby the coast-guard signalling station. Both were undefended towns. And in all three cases shells were deliberately fired at the towns themselves. The persons thus murdered amounted to considerably over a hundred, the injured to a far greater number, and many were women and children. Altogether the attacks went on for over an hour. At the same time mines were laid in the neighbourhood.

The British had heard that an attack of some kind was intended. The Germans had heard of the Falklands-battle and knew that two of the British battle cruisers were far away. There was a gap in the minefields and by it the enemy was expected to go back. In consequence the 2nd Battle Squadron and the Battle Cruisers were ordered to a rendezvous. Light cruisers and destroyers had also come out and were looking for the enemy. Mr. Filson Young, in "With the Battle Cruisers", describes the imperfectly understood or delayed signals which were received during the morning as to the whereabouts of the Germans. The various reports formed a puzzle as to the enemy's forces and movements. The explanation was that the second German group[1], finding the seas too heavy for them to maintain speed, were ordered back very early in the morning, and that the German battle fleet had turned back about the same time.

The German battle cruisers after their raid retired E. N. E. and passed north of the British battle cruisers. The two forces were not far apart about 2 p. m. and again at 3.30 p. m. when the British battle cruisers were chasing the Germans — unsuccessfully — eastward.

[1] Light cruisers and destroyers. After them came the German battle fleet.

The light cruiser Southampton was, at about 11.30 am. in contact with enemy light cruisers. A searchlight signal "Light cruisers resume your positions", directed to the Nottingham and Falmouth, was received also by the Southampton. In consequence Commodore Goodenough lost touch with the enemy. The same enemy light cruisers soon afterwards fell in with the 2nd Battle Squadron, gave it the same recognition signal which the Southampton had given them and escaped in the mist.

One object of the raids was, no doubt, to cause panic in England in the hope that the outcry would cause British warships to be diverted from their proper work in order to patrol the coast. According to Scheer the idea was that British ships would chase the raiders and be led on to the German battleships which would be waiting. But they did not wait. They turned back for fear of destroyer attack in the dark. Scheer also implied that the raids were made to improve the morale of his men.

A lesson learnt that day was never to send the battle cruisers to sea without proper support. If the German battle fleet had held on, the battle cruisers might have been lost by being caught between it and the German battle cruisers. The 2nd Battle Squadron — which was too far away for immediate support — might also have been caught. The Grand Fleet would then, as remarked by Sir Julian Corbett ("Official History of the War, Naval Operations", Vol. II) have been worn down almost to the level of the High Seas Fleet. The day was one of the most remarkable in the war the escape of the German big raiding ships being marvellous and the escape of the British big ships being a matter for congratulaton.

Mr. Filson Young comments unfavourably on the procedure adopted by the Admiralty when they heard

the Germans were coming out. They fixed a rendezvous and told Beatty to be there. If he had been given the full facts he would have gone further to the south-west and the Germans would not have escaped. Later the Germans found out that their movements were known beforehand and then it became difficult to take them unawares.

Losses of big ships. On 15th October, the cruiser Hawke — well-known for her collision with the great liner Olympic by reason of the suction of the latter — patrolling in the North Sea with other cruisers, was torpedoed by a submarine and sank.

On the 27th October the post-Dreadnought battleship Audacious (23,000 tons) ran onto a mine off the island of Mull. She was taken in tow by the liner Olympic but soon afterwards sank. This event, witnessed by great numbers of people was not allowed to be published in the United Kingdom. The Germans did not know of it for weeks. The Admiralty did not wish them to derive encouragement from the occurence. It was believed by many that the Audacious had been beached or sunk in shallow water. The German auxiliary cruiser Berlin had bravely penetrated to the spot and laid 200 mines. She escaped and reached Denmark and was interned.

When the Hawke was sunk — another cruiser the Theseus was damaged — it became clear that it was too dangerous for cruisers to work in the central part of the North Sea without destroyers. The cruiser patrols were then shifted further to the north and east of the Shetlands while small craft watched the Fair Island Channel — between the Orkneys and Shetlands — and the Pentland Firth on the North Sea side. Auxiliary cruisers were largely used instead of regular cruisers. The battle fleet either cruised to the north and east of the Shetlands or was kept to the west of the Orkneys,

where it formed a second blockade line and supported the cruisers.

The Bulwark and the Formidable were two battleships of old type but each of 15,000 tons. The Bulwark when lying at Sheerness on 26th November 1914 was blown up with the loss of nearly every one on board, the disaster being attributed to internal explosion.

In stormy weather in the Channel and during the dark early hours of the 1st January 1915, the Formidable — passing down the channel with other ships of the Channel Fleet — was struck by two torpedoes from a German submarine and sank quickly. This is an instance of a submarine coming to the surface in rough weather. Of the Formidable's complement of 800 only a fourth were saved, some getting to land in boats and seventy men in a cutter being rescued by the trawler Providence whose master, Captain W. Pillar, and crew behaved with conspicuous gallantry and skill. The blame for the loss of the Formidable was placed by Lord Charles Beresford on the Admiralty but they placed it on the Admiral for not adopting a zig-zag course.

German Raiders. On the 26th August 1914, the large German auxiliary cruiser, Kaiser Wilhelm der Grosse, caught while coaling in West Africa, was sunk by the cruiser Highflyer.

When war broke out the German ships based on Kiaochao were the armoured cruisers Scharnhörst and Gneisenau and several light cruisers. Admiral Von Spee took most of the ships into the Pacific. The Scharnhörst and Gneisenau shelled the open town of Papeite in the Society Islands. These vessels did not raid but were intended to attack British light cruisers. The light cruisers Emden and Königsberg, evading the Japanese, made for the Indian Ocean. The Germans had made preparations for commerce raiding and their cruisers were met by colliers.

At Hong-Kong the British submarines had prevented the German raiders from coming too near. They also prevented the sailing of colliers to supply the raiders. It was want of supplies which prevented Admiral Von Spee from seizing the Falkland Islands before Admiral Sturdee arrived there (art. 3). If the Falklands had been lost the Allies would — according to Lord Fisher — have lost the war for want of nitrate. Thus Hong-Kong was of importance and naval strategy is world-wide. (Vice-Admiral Sir Robert H. Anstruther in the "Times", 26th Nov. 1920).

The Emden — she was armed with 4-inch guns — captured and destroyed 17 merchant ships, mostly in the Bay of Bengal and off the Malabar coast. She fired salvoes at the oil tanks at Madras and set them on fire. The shore batteries replied but the shots fell short. In the harbour of Penang she torpedoed and sank the Russian light cruiser Jemtchug. The Jemtchug fired a few shots without effect. Outside the harbour the Emden sank the French destroyer Mousquet. She rigged up a fourth funnel and, when passing a Japanese cruiser, flew the British flag. At the Cocos-Keeling Islands the Emden — still carrying her extra funnel and being mistaken for a British ship — landed a party and destroyed the wireless station and its stores. At 9.20 a. m. on the 9th November she steamed away. But the cruisers were on her track. The Australian convoy was passing by. The cruiser Sydney of the Australian Navy carrying 6-inch guns, set off in chase, met her off the N. Keeling Island and destroyed her by gunfire, the Emden being run ashore in the course of the fight. The Emden's landing party escaped in a sailing vessel which they seized. The Sydney received slight damage.

A cruiser which nearly equalled the Emden in the number of her captures was the Karlsruhe. She operated

in the South Atlantic on the South American coast. She disappeared, and it was afterwards found that she had been lost by explosion in the West Indies. Other German raiders were chased, driven into neutral ports and interned.

For further events in connection with the German raiding ships see Art. 3.

The Naval Air Raid. On Christmas morning 1914 the warships in the German fortified harbour of Cuxhaven, were bombarded by seven British seaplanes which were accompanied by a cruiser, submarines and destroyers. The ships were attacked by enemy Zeppelins and seaplanes which they drove off and by submarines which they eluded, and finally got away without damage after picking up their airmen, except one who was picked up by a Dutch fishing boat.

The Battle of the Dogger Bank. Early on the 24th January 1915, Vice-Admiral Sir David Beatty, patrolling in the North Sea with his battle cruisers — his flagship was the Lion and following her were the Tiger, Princess Royal, New Zealand and Indomitable — saw about 7.15 a. m. the flash of guns and soon afterwards received a signal from the light cruiser Aurora, which was in advance, that she was engaged with enemy ships. At 7.35 a. m. the light cruisers and flotillas were chasing the enemy and the battle cruisers following. The German squadron consisted of three battle cruisers — the Seydlitz, Derfflinger and Moltke — the armoured cruiser Blücher of 15,550 tons, four light cruisers and a flotilla of destroyers. Scheer states that the object was to destroy any enemy light forces met with near the Dogger Bank. There had been a long period of bad weather and inaction.

Speed was gradually increased. By 9 a. m. that of the Lion, Tiger and Princess Royal was 29 knots. The enemy was being overhauled. The course was S. S. E. and was to starboard of that of the enemy. By 9.15 a. m. both sides were firing and the Lion had hit the Blücher, the rearmost enemy ship.

A remarkable feature of the battle was the concentration of fire on the Lion. From 9.30 a. m. to nearly 11 a. m. the three enemy battle cruisers were firing at her. And one of them was firing undisturbed. At about 9.35 a. m. Vice-Admiral Beatty signalled to the battle cruisers to engage opposite numbers. The Tiger, however, continued to fire at the leading enemy ship — this being due to the belief that the Indomitable, the rearmost ship, was within range and engaging the Blücher. Actually the New Zealand and Indomitable, especially the latter, had fallen astern though they had by extraordinary efforts, beaten any of their previous speed performances. The New Zealand was engaging the Blücher. Thus the Derfflinger was left unfired at. Also the enemy smoke caused the Tiger to lose sight of the leading enemy ship, and some of her salvoes went over.

Before 11 a. m. the Blücher was well on fire, the Seydlitz and Moltke were on fire, and the Lion had received terrific blows from well-bunched salvoes, had had narrow escapes from magazine explosions and had her port engine stopped. She could no longer keep at the head of the line. At 10.48 a. m. the Blücher hauled out to the northward and the Indomitable was ordered to attack her. The Lion, having sighted enemy submarines on the starboard bow, had signalled to the squadron at 10.54 a. m. to turn together 8 points to port — this would be nearly north — and at 11.2 a. m. "course N.E.". The Lion's wireless was out of action, and she had only two halliards left. Beatty hoisted — shortly after 11

a. m. — two short signals, "attack the enemy's rear", and "keep closer to the enemy". His intention was that all the ships except the Indomitable should follow the enemy battle cruisers, but actually they all attacked the Blücher. The two last signals were difficult to read, because the flags blew end-on to the battle cruisers. The first of the two was hoisted before the "course N.E." had been hauled down. Rear-Admiral Moore in the New Zealand — also the Tiger and Princess Royal — understood that the meaning was "attack the enemy's rear bearing N.E.". The signal "keep closer to the enemy" was not taken in by any of the ships. The Blücher was sunk and the rest got away. Again, by extraordinary luck, the Germans had escaped destruction. The Lion, drawing 37 feet forward, was towed into the Forth by the Indomitable.

The German battle cruisers had been repeatedly hit, especially the Seydlitz. The German Admiral Scheer describes in his book the terrible effects of the first shell — from the Lion — which struck this ship. Piercing the deck near the stern and the armour of the after barbette, it exploded. Ammunition was set on fire. The flames rushed up into the turret and down into the munition chamber, thence into the munition chamber of the next turret and up into that turret. The guns of both turrets were put out of action and the gun crews killed.

Regarding the Blücher Lord Fisher states: "It was the plans of the Indomitable which the Germans thought they had secured by stealth and subtlety from the Admiralty, and which formed the basis of the design of the Blücher. It was not until after the Indomitable was completed that they realised they had been deceived, and had not only wasted their Secret Service money to no purpose, but had built a smaller, slower, and weaker ship."

The intended sailing of the German squadrons "to scout on Dogger Bank" was known to the Admiralty the day before, and they directed, by wireless, the concentration of Beatty's ships and the others, at the right spot.

General. When war broke out no harbour in the United Kingdom was adequately protected against the entry of submarines. At first the Grand Fleet had to keep cruising almost continuously. Energetic steps were, however, taken to provide proper obstructions and in the meantime improvised contrivances were arranged. A great establishment was organised at Shotley to provide steel wire nets.

When the defences at Scapa Flow were complete the Grand Fleet made sweeps through the North Sea less frequently. As intelligence work improved, the sweeps — which were costly and attended with danger — were made only when the Germans were known to be out. Lighter ships made them often. The battle cruiser base was shifted to Rosyth. Lord Jellicoe has explained ("With the Grand Fleet") that in the southern part of the North Sea the British fleet could not cruise at a speed of more than 10 knots — because mine-sweepers had to go ahead of it — nor zig-zag. In the northern part the depth is great and the mine-layers would have been seen. Ordinarily the Grand Fleet remained there. When mine-sweepers could not work ahead of the Fleet, old battleships were stationed ahead of it so that they would be the first to strike mines.

Mines were laid by Great Britain between Ostend and the Goodwins in order to prevent German submarines getting into the Channel and to compel ships to go through the Downs. The Germans managed to lay mines all over the world. There were mines off the

Name of Ship	Kind of ship	Displacement (tons)	Year of Launch	Speed (knots)	Thickness of Armour (inches)	Guns				
						9.2 in.	8.2 in.	6 in.	4.1 in.	4 in.
		British Squadron under Cradock.								
Good Hope	Armoured Cruiser	14,000	1901	22.5	6 (belt)	2		16		
Monmouth	Do.	9,800	1901	22	4 (belt)			14		
Glasgow	Light Cruiser	4,800	1909	25	2 (deck)			2		10
Total		28,700				2		32		10
		German Squadron under Von Spee.								
Gneisenau	Armoured Cruiser	11,600	1906	23	6 (belt)		8	6		
Scharnhörst	Do.	11,600	1906	23	6 (belt)		8	6		
Dresden	Light Cruiser	3,250	1905	26	2 (deck)				10	
Leipzig	Do.	3,600	1907	22	2 (deck)				10	
Nurnberg	Do.	3,400	1906	23	2 (deck)				10	
Total		33,450					16	12	30	

targets, the Dresden and Leipzig. The 6-inch guns of the Good Hope and Monmouth could not be properly worked because of the heavy seas, these guns being on the main deck and near the water. At 7.50 p.m. the Good Hope, which had been emitting very high flames, blew up. It was now dark but the remaining ships fired at the flashes of the guns. The Monmouth was badly down by the bow and turned away to get her stern to the sea. The moon rose and the Monmouth and Glasgow saw enemy ships approaching. The light cruiser Nürnberg had come up. She sank the Monmouth. The Glasgow, unable to help went ahead at full speed to avoid destruction. There were no survivors from either of the lost ships. The sea was too high for boats to be lowered.

Why did Cradock proceed northwards without the Canopus and so render himself liable to become engaged in this unequal battle? It has been mentioned (Chap. V. art. 2) that to engage in a battle in which defeat is almost certain, may be justifiable on account of the damage likely to be inflicted on the enemy. This may have appeared to Cradock to be such a case. He knew that his obsolete ships would not be of much account but that the enemy, having no base anywhere near, could not make good any heavy damage nor easily obtain more shells. There was just a chance that the British 9.2-inch shells might strike the enemy early in the action, damage his morale and spoil his gunnery. A lucky shot might even blow up a ship. But it is not certain that Cradock held the above views. The inequality in the two squadrons was very great. The responsibility for the defeat with its loss, not only of ships but of prestige and of officers and men, must rest chiefly on the Admiralty. Cradock's orders were to "search" and be "prepared to have to meet the enemy". He could not search effectively with the slow Canopus in company. An order

to seek out the enemy is one that is never disregarded in the Navy. It is true that a further cable — Lord Fisher was now First Sea Lord — directed Cradock not to act without the Canopus, but the message had not had time to reach him. If, when the German squadron was sighted, Cradock had attempted fo fall back on the Canopus, he would almost certainly have been brought to action before he could reach her. Von Spee could have left his "lame duck" — the Leipzig — behind.

If the Admiralty had provided Director fire control on the Good Hope and Monmouth their guns could been been properly worked even in a sea-way; but here, as in so many cases, it was doubtless a question of money.

The Battle of the Falklands. In that same month of November 1914, the battle cruisers Invincible and Inflexible — each of more than 17,000 tons and each carrying eight modern 12-inch guns and able to steam at 26 knots — received orders for service abroad. They were under repairs which were expected to take till the 11th. Lord Fisher wired that the repairs must be finished on the 8th, otherwise the ships were to sail with the dock-yard artificers on board. And so they did. Vice-Admiral Sturdee was in coommand. Shaping its course southwards the squadron coaled at the Azores. The days rapidly grew longer. Crossing the equator the squadron reached the secret base at Abrolhos Rocks — the very name sounds mysterious — where there were other cruisers. Six or eight ships, spread out to utmost visual distance, swept down the South American coast. On the 7th December they were in the larbour of Port William, 7,000 miles from the British shores.

Thus it happened that when Von Spee, with the same squadron which had annihilated Cradock's two ships at Coronel, appeared on the morning of 8th December off the Falklands Islands, he found there not only some

cruisers and the old battleship Canopus — she was used as a fort to defend the coaling station — but the two great battle cruisers. The British ships lay in the land-locked harbour of Port Stanley. It was hoped that Von Spee might not see the battle cruisers and a smoke screen was raised. He saw them however — a German officer has related with what dismay he caught sight of the "dreipod masts" — and promptly made off. Steaming away to the south-east he was pursued by the battle cruisers with the cruisers Carnarvon, Cornwall and Kent, and the light cruiser Glasgow, the squadron starting at about 9.45 a.m. The sea was calm and the sun shone brightly. The German ships could be seen hull down. As they looked back they could see the terrible tripod masts. Sturdee had long hours of daylight before him, the length of the day in the Falkland Islands in December being about the same as that in London in June. At first he kept his ships together but at 12.20 p.m. he pushed ahead with the battle cruisers. At 12.45 p.m. he opened fire and soon hit the Leipzig. At 1.20 p.m. the three enemy light cruisers turned away south-east to escape. They were pursued by the Kent, Glasgow and Cornwall. The Carnarvon, whose speed was less, continued to follow the battle cruisers, but was unable to take much part in the battle.

The main action continued throughout the afternoon. It was prolonged because the battle cruisers were generally troubled by their smoke and that of the enemy — Von Spee no doubt shaped his course so as bring this about — and their shooting was accordingly bad. At 1.25 p.m. the range being about 14,000 yards the Scharnhörst and Gneisenau turned about seven points — eight points make a right angle — to port. Sturdee closed the range to 13,000 yards and was hit. After that the range opened and closed, both sides made turns — of

2 to 18 points — and sometimes brought their broadsides to bear. By 3.30 p.m. the German ships had suffered great damage. By 4 p.m. the Scharnhörst, some of whose guns were not firing, had listed badly and at 4.17 she sank. The Gneisenau continued to fight, part of the time with a single gun. At 6 p.m. she heeled over and sank. Many of her crew were saved.

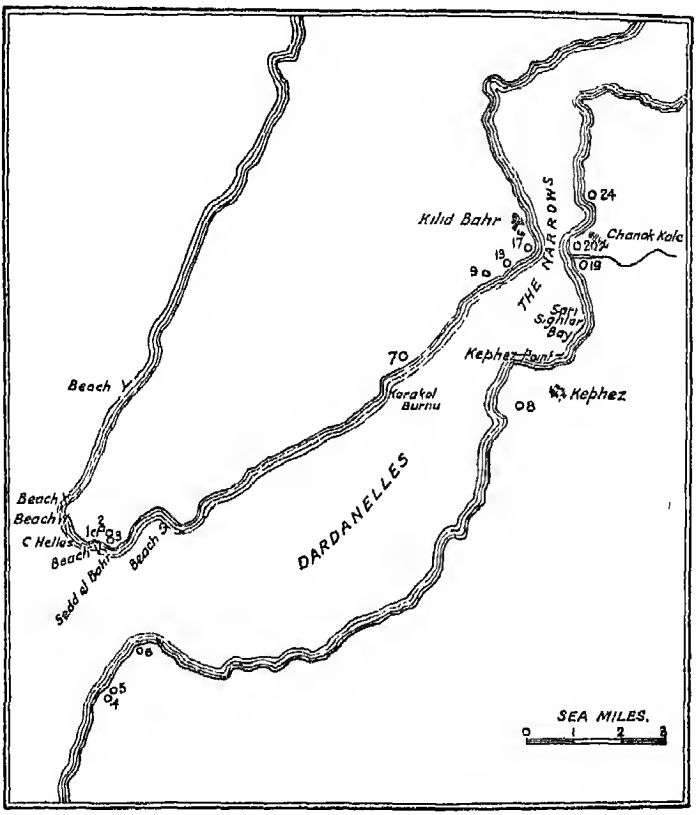
The three German light cruisers which left their consorts at 1.20 p.m., as above set forth, carried 4.1-inch guns, the British pursuing ships 6-inch. The latter were however of old pattern and low elevation and were actually outranged by the smaller enemy guns. The Dresden was too fast for any of the British ships and got away. The Glasgow engaged the Leipzig, the rear ship, compelled her to turn her broadside in order to reply and thus delayed her. The Kent and Cornwall came up. The Kent, anxious to fight the ship which had sunk her sister the Monmouth, was told off to engage the Nürnberg. She worked up her speed to a wholly unexpected figure, overhauled her enemy and sank her at 7.27 p.m. The Leipzig had to fight the Cornwall and Glasgow. As the long summer day changed into night the broad surface of the ocean was aglow with her flames; and she went down. Coronel was more than avenged. Within eighteen weeks from the declaration of war, German raiding on the high seas had received its death blow. The Invincible and Inflexible were ready to be returned practically undamaged — this had been an instruction to Admiral Sturdee — to the Grand Fleet.

The Dresden after her escape, took refuge in the maze of channels and islands near the Straits of Magellan. From there she went to the Juan Fernandez group of islands. The sailings of her colliers gave indications from time to time of her whereabouts. A prolonged chase after her was carried out by British cruisers though they were

more than once put on false scents by the Germans. She habitually violated Chilean neutrality by taking refuge in Chilean territorial waters — in places where there was no-one who could forcibly intern her — and staying as long as she chose. Great Britain informed Chile that if the Dresden was found in such circumstances she would be sunk. Chile protested both to Great Britain and to Germany. At last the Glasgow, Kent and Orama — an auxiliary cruiser — caught the raider in Chilean waters near Juan Fernandez. They began to shell her but the shelling was stopped while she sent out to the British flagship a request for internment. This being refused she was sunk by her own ship's company who were duly interned.

Art. 4. Turkey. *The Dardanelles operations.* The length of the Dardanelles Channel is thirtyfive miles and its width generally two or three miles, though it is less then a mile at the Narrows which are at the place where the channel bends to the north fifteen miles from the Mediterranean end. The channel was protected by numerous strong forts and batteries — shown by small circles on the accompanying map — the most formidable being at the Narrows where the banks are steep and high. The water is generally twenty-five to fifty fathoms deep and there is a surface current of one or two knots — three to four knots in the Narrows — from the Sea of Marmora into the Mediterranean. There is an undercurrent in the opposite direction. On 3rd November 1914 the forts — numbers 1, 3, 4, and 6 — at Kum Kale and Sedd-el-Bahr, at the entrance of the Dardanelles, and the Cape Helles battery were bombarded during a short run, range 13,000 yards, by four ships two being British battle cruisers and two old French battleships. This was done in the hope that

the Turkish government might possibly be brought to its senses. The forts replied but only the 9.4-inch projectiles fell close. Great damage was done to forts 3 and 6. In no. 3 there was a heavy explosion.



When it was decided that ships of war should endeavour to force a way through the Dardanelles with the object of appearing before Constantinople, the heart of the Turkish Empire, a number of old battleships, British and French, were collected for the purpose and were, together with the new battleship Queen Elizabeth, the battle cruiser Inflexible and some British and French

cruisers, based on the harbour of Mudros which is in the island of Lemnos and is some fifty miles from the entrance of the Dardanelles.

The Dardanelles channel was known to be mined. The plan adopted was to bombard the forts and batteries near the entrance, silence the guns or as many of them as possible and, during the nights, to sweep up the mines in the area in which the ships would next have to manoeuvre in their progress along the channel. Then the ships were to enter this cleared water and bombard the next forts, the mine-sweeping proceeding yet further along, and so on. The mine-sweepers were British trawlers; destroyers were employed to protect them.

The results of the operations showed that the forts could in most cases be silenced, but generally firing recommenced after a time. In some cases the silencing was due to dust and flying debris which drove the gunners off without the guns being seriously damaged. In other cases the guns, or fresh guns, were mounted again in hidden positions. Howitzers and field guns constantly fired from new positions and were well concealed.

On the 19th, 25th and 26th February 1915, operations were undertaken against forts 1, 3, 4 and 6. On other days they were prevented by rough weather. When most of the guns had been silenced by long range fire other ships drew in to shorter ranges, used their secondary armament and added to the damage. The results were generally satisfactory and the casualties to the attacking side small. The ships silenced the forts. Few or no mines were met with.

In a few places near the entrance of the channel, parties of men were afterwards landed in order to blow up whatever they found still existing. The parties, though they destroyed some big guns, met with opposition and some

had to retire after having effected little. On one occasion a party could not retire across the open nor could the ships shell the attacking enemy, their own men being in the line of fire. They were rescued by destroyers which came close in and shelled the enemy.

On 1st and 2nd March, attacks were made on forts 7 and 8 and on various batteries. Mine-sweeping was effected up to within 3,000 yards of Kephez Point, but the minefields, especially near the Narrows, were covered by enemy guns and search-lights. Further progress in mine-sweeping was stopped by the heavy enemy fire. The 3rd and 4th March were foggy. Some mine-sweeping was effected.

On the 5th, 6th and 7th March forts numbers 7, 8, 13, and 19, at and near the Narrows, were attacked. The Queen Elizabeth with her 15-inch guns attacked by "indirect fire" across the Gallipoli peninsula, spotting being done by seaplanes and by ships in the Dardanelles and the range being about 21,000 yards. The mine-sweepers were again driven off by enemy gunfire. This was often intense, the effect on the trawlers and crews being such that only a few of the sweeps could be got out. The magazine in one fort was blown up by a shell from the Queen Elizabeth. On 8th and 9th March the weather was misty and little was done.

Failures to clear the minefields seriously delayed the progress of the expedition. The search-lights were fired on by the destroyers but could not be extinguished. On the night of the 10th March seven sweepers with picket boats fitted with explosive creeps, entered the Straits. They and their two supporting destroyers got above the minefield with the view of sweeping down with the current — they could make little progress against it — but owing to the heavy enemy gunfire little was effected. A similar attempt was made on 13th March

with a like result. On both occasions however the picket boats blew up the cables of electric mines. The 12th March was misty. On the 14th to 17th March minesweepers cleared up the area inside the Straits in which ships would have to manoeuvre in the next attack.

It had by this time been decided that the Dardanelles could not be forced by means ot ships alone; joint land and sea operations were decided on. Transports with British and French troops assembled at Mudros but General Sir Ian Hamilton, who had command of the land forces, found that the transports had been wrongly loaded. It was essential that when the landings were made the guns, munitions and other things required first should come out first, and the loading had not been arranged so that this could be done. The transports steamed away to Egypt to be reloaded. It was decided to make another attack on the Dardanelles by means of ships alone. The idea was to silence the forts and the minefield defences simultaneously. On 16th March, Vice-Admiral Sir Sackville Carden who had had charge of the operations was, owing to illness, relieved by Rear-Admiral John M. de Robeck.

On the 18th March, the battleships Triumph, Queen Elizabeth, Inflexible, Lord Nelson, Agamennon and Prince George, proceeding three miles up the channel, opened fire, about 11.30 a.m. and at long range, on the forts and batteries of the Narrows. Shortly after noon the French battleships Gaulois, Suffren, Bouvet and Charlemagne, passing the British ships and steaming up to near Kephez Point, bombarded the Narrows positions at short range. The shore guns replied and their practice was good. About 1 p.m. the Inflexible had her fore bridge set on fire. About 1.25 p.m. her control top was wrecked by a shell and every one in it disabled. She quitted the line to make good. Soon afterwards

the British battleships Vengeance, Albion, Irresistible, Majestic, Ocean and Swiftsure entered the Dardanelles to relieve the French battleships and the Prince George and Triumph. Steaming up to Kephez Point the relieving ships opened fire at 2.30 p.m. on the Narrows positions. The forts had not been silenced except temporarily. At 3.14 p.m. they were all firing but inaccurately.

At 1.54 p.m. the Bouvet, struck by a drifting mine — or by a big projectile which caused a magazine explosion — as she was leaving, had blown up and sunk quickly, with the loss of nearly all on board. At 4.11 p.m. the Inflexible, struck by a drifting mine, made her way to Tenedos where she anchored. At 4.15 p.m. the Irresistible, similarly struck, moved down the channel and sank, her crew having been saved by the destroyer Wear under a heavy fire. The Ocean, similarly struck at 6.5 p.m. sank in a short time, most of her crew being rescued. The Gaulois, badly damaged by gunfire grounded on Drepano Island. At night the ships, defeated, drew off to Tenedos. A resumption of the attack was not sanctioned by the Admiralty.

Subsidiary operations were the bombardment of the Bulair isthmus. Also of the defences of Smyrna in order to create a diversion. The seaplane carrier Ben-my-Chree was sunk by gunfire at Kastelorizo off the coast of Asia Minor.

Something of a romance attaches to the old ship Vengeance. At the naval manoeuvres of 1906 she was the fastest battleship in the service. After the Dardanelles operations she was Admiral Charlton's flagship on the Cape Station. On her last voyage of all — she was being sent across to France to be broken up — she broke loose from her tugs and was for six days adrift in the Channel.

The responsibility for the attack on the Dardanelles by ships unsupported by land forces has been divided among many persons. It is possible that if persisted in it might have succeeded. Lord Fisher estimated that it might cost a dozen ships. Vice-Admiral Carden had stated that the Dardanelles could not be rushed but could be reduced by a systematic bombardment. If the ships had got through great results would have followed. Turkey would have collapsed, Russian exports have been set free, Bulgaria and Greece have joined the Allies. The stake was worth playing for. Land forces not being at the moment available an attack by ships alone was made. This exposed the plan. When, in April, land forces arrived, the Turks were ready. The land campaign broke the military strength of Turkey and was at one time within measurable distance of success. But the whole of the operations, sea and land, should have waited till April.

The Gallipoli Landings. In due course the re-loaded transports returned from Egypt. In Mudros harbour was a great assemblage of ships. From there they proceeded to Tenedos which was nearer to Gallipoli. On the night of 29th April 1915, the landings at Gallipoli were undertaken. The troops, conveyed on battleships, cruisers, transports or mine-sweepers, up to within a short distance of the shore, were then transferred to boats which were towed by the steam pinnaces — one pinnace towing a number of boats in line, one following another — till close to the places which had been selected for landing. These operations had been carefully rehearsed. The men landed, under, in many cases, terrific fire from the enemy, in spite of heavy bombardment of the enemy positions and troops by the battleships which included French ships and the Russian cruiser Askold. Landings were effected at "Beaches" S, X, Y, V and W.

At Beach W the enemy had prepared wire entanglements and trenches and machine guns. There were eight picket-boats, each of which towed four boats. The troops on landing were subjected to terrible fire while cutting their way through the barbed wire.

At Beach V there were steep cliffs surmounted by ruins and buildings which gave cover to the Turks. When the thirty-two boats, which had been towed by eight picket boats, touched the beach, the fire was such that few of the soldiers or of the boats' crews survived for long. None of the boats got back. The main landing at this beach was effected from a collier, the "River Clyde", in the sides of which large doorways had been cut. From the doors there were gangways along the ship's side to the bows. The ship was run ashore and the men, issuing from the doors, made their way along the gangways to the bows and then into two lighters which acted as a bridge between the ship and the beach. Owing to the strong current there was a gap, too wide to jump, between the lighters. Some men who jumped into the sea were drowned, others were shot while on the first lighter. Attempts to pass lines from lighter to lighter and to get them into proper position were only temporarily successful. A line broke and the positions became worse. The Clyde and the lighters were subjected to heavy shrapnel fire. Machine guns which had been mounted on the Clyde kept the enemy from closing in. A launch and a pinnace manned by volunteer crews came off from the Albion with the object of getting the lighters into position but work was stopped till it was dark. After dark the rest of the men on the Clyde disembarked without meeting with any opposition.

In the later landing at Suvla Bay in August, 1915, monitors and cruisers rendered torpedo-proof gave assistance. Suvla Bay is on the west Coast of Gallipoli a few miles north of the portion shown on the map.

Throughout the period of eight or nine months during which the Allied forces occupied Gallipoli, the transport to them of everything they required, including drinking water, threw a great and continuous strain on the Navy. The ships also constantly supported the troops by bombarding the enemy positions. It was during these operations that the British battleship Goliath was sunk by a destroyer, and the Triumph and Majestic by submarines, the dates being respectively 13th, 25th and 27th May 1915. This led to the appearance on the scene of the low-draught monitors and of the "blister ships" (Chap. III Arts 4 and 5) which took the places of the battleships. The Queen Elizabeth had departed from Turkish waters. The German submarines — some came by rail in pieces and were put together in Turkey — had been looking for her and Lord Fisher has stated that one of them torpedoed her duplicate wooden image. It is said that the Hun submarine commander went mad when he discovered his mistake. A fleet of dummy battleships had been constructed early in the war "to draw off the submarines." It appeared once in the Atlantic and puzzled the enemy not a little.

The withdrawal of the whole Gallipoli force by sea in December 1915 and January 1916 was a magnificent and unique achievement in which the British Navy took a large share.

A feature of the Dardanelles operations was the resignation by Lord Fisher of the office of First Sea Lord. On the 14th May 1915 the War Council decided that combined land and sea operations on the Dardanelles must continue. This involved an increase in the naval part of the work and an absorption of the new monitors which Lord Fisher had intended for the Baltic and North Sea schemes. When he had agreed to the earlier operations the idea had been a rapid and sudden blow by combined

land and sea forces. He now saw that the Dardanelles operations would be prolonged, and his own schemes doomed and he resigned his post. His immense driving power was thenceforth lost to the nation.

Submarine Exploits. British and French submarines operated in the Dardanelles and the Sea of Marmora on various occasions. On 13th December 1914, B. 11, making her way under various mines in the Dardanelles, torpedoed and sank the Turkish battleship Messudieh of 9,120 tons. In April 1915, E. 15 stranded near Kephez Point, some of those on board being killed by gunfire. On the following night two picket boats set out, one from the Majestic and one from the Triumph, and succeeded by means of torpedoes in making the submarine useless to the enemy. The boats were subjected to hot fire from Fort Dardanus which is near to Kephez Point. One boat was sunk but its crew was picked up by the other which returned with only one casualty. On 30th April, A. E. 2 was sunk in the Sea of Marmora and the crew captured. On 26th July the same fate overtook the French submarine Mariotte. E. 14 and E. 11 made their way into the Sea of Marmora, the former sinking a Turkish gunboat and other ships, the latter going to Constantinople and torpedoing a transport. Other submarines which went on similar missions were E. 7., E. 20, Joule and Turquoise. All of these were lost. To their credit is to be placed the bombardment of powder mills and of railways and trucks, the torpedoing and sinking of the battleship Kheyr-ed-din Barbarossa and the sinking of the destroyer Yar Hissar. The submarines amongst them sank several torpedo gunboats, several transports and large numbers of other ships.

Art. 5. The submarine Campaign. Early in the war

German submarines began to sink Allied merchant ships. This procedure might have been legal (Chap. IV. art. 1) if in each case the ship had been searched and had been found to be an enemy ship, or to be carrying contraband, and if the crew and ship's company and papers had been transferred to a place of safety. This procedure was not followed, though at first the crews were given a little time in which to get away in their boats.

In February 1915 Germany issued the following proclamation: — "All the waters surrounding Great Britain and Ireland and all English seas are hereby declared to be a war zone. From 18 February all ships of the enemy mercantile marine in these waters will be destroyed and it will not always be possible to avoid danger to the crews and passengers thereon". The proclamation added that neutral ships would run a risk chiefly because the British Government had ordained the misuse of neutral flags. The proclamation mentioned a route which would be safe — round the north and east of the North Sea — and it stated that the measures were taken because of England's procedure which was contrary to international law.

The procedure of Germany in connection with international law had been, according to Sir Julian Corbett (*"Official History of the War. Naval Operations"*, Vol. II, Chapter XV.) as follows:

Germany had (a) sown mines in the open sea, (b) sunk prizes in nearly all cases instead of in exceptional cases, (c) refused to pay for neutral goods in enemy (Allied) ships which she sank, (d) imprisoned the crew of a British ship sunk by a mine in the Elbe before war was declared, (e) made prisoners of war of all men of military age in conquered districts of France and Belgium, (f) made lumber contraband thereby greatly straining the rules of the Declaration of London. She had thus trampled underfoot the Hague Conventions.

Great Britain had taken German men of military age from a neutral ship nnd made them prisoners but this was a very partial retaliation for (e). Great Britain and her Allies had also made the doctrine of continuous voyage applicable to conditional contraband including food stuffs. This was an extension of existing customs but was not unjustifiable and it violated no principle of international law Food stuffs were conditional contraband only when consigned to a military or naval base. When it was reported that the German Government had commandeered all wheat arriving in Germany the Allies decided to make it all conditional contraband. They began to seize it even if it was consigned to a neutral port. The report of the commandeering being found to be premature, the Allies did not actually make the wheat contraband nor confiscate it, but they diverted it to themselves and paid for it — there was a precedent for this in the War of the French Revolution — and this was the state of affairs when the German proclamation was issued. Later on, when the commandeering was found to have been carried out, the wheat was made contraband. The use of a neutral flag by Great Britain was in accordance with custom; see Chap. IV, arts. 3 and 5.

Germany's main argument was that Great Britain was illegally attempting to starve her. To starve an enemy is, of course, not illegal. Another statement was that the neutrals were illegally engaged in contraband trade with Great Britain and that Germany would wage war against that trade by every possible means.

The German Government, in February 1915, proceeded to carry out the "submarine campaign" which they had notified. The methods adopted towards merchant ships became worse. The custom of torpedoing or shelling the ships without warning became quite a usual one. Sometimes the crew were put into boats at a

great distance from land. Sometimes they were shelled while getting into boats. Frequently there were cases of the grossest barbarity. Boats containing men who had abandoned their ship were fired upon or rammed. The British ship Belgian Prince was torpedoed by a German submarine on 31st July. The crew abandoned the ship in two boats and were ordered onto the upper deck of the submarine by the German commander. Under his directions the boats were then smashed with axes and the crew of the Belgian Prince deprived of their lifebelts. The submarine then submerged without warning with 43 men standing on her deck. With the exception of three, all were drowned. The three survivors had contrived to retain their lifebelts without the knowledge of the enemy. They were picked up after having been in the water 11 hours. At a later period, orders were given in some cases to submarine commanders to sink ships without leaving any trace of them (*Spurlos Versenkt*). But all these outrages did not prevent the heroic men of the mercantile marine from continuing to go to sea.

Neutral vessels did not escape, the reason given for attacking them being that the British Government had ordered the use of neutral flags by their vessels. Liners full of passengers — notably the Lusitania on 7th May 1915 — were torpedoed without warning and great numbers of non-combatants drowned. The campaign extended to the Mediterranean where both German and Austrian submarines took part in it. In September 1915 it had to some extent died away, the measures taken to destroy the submarines having been fairly effective, but many more submarines were built.

In February 1916 a fresh submarine campaign was begun. This time the reason given was that the British were arming their merchant ships with guns in order to make attacks on submarines. The allegation was ground-

less. The submarine operations extended to the coast of the United States.

The earlier measures taken by the Allies for actual attack on the enemy submarines were those described in Chap. III. art. 9. Explosive paravanes were also used (Chap. II. Art. 4). The minefields laid by the British in the North Sea were largely extended, as already mentioned, to hinder the progress of submarines. The Q-boats began operations in July 1915. Rewards were given by various British ship-owners to the crews of merchant ships which sunk enemy submarines.

The measures taken by the belligerents in connection with the blockade of Germany and the submarine campaign gave rise to vehement protests by neutrals and notably by the United States. The protests concerning the action of Great Britain in the matter of the stoppage and searching of ships, and the legality of her measures generally, have been discussed (Chap. IV. art. 7 and 8). Between the United States and Germany there was protracted correspondence. The government of the former country while protesting in the strongest manner against the violation both of the laws of humanity and of international law, showed remarkable patience. The German government was generally dilatory in replying, drew attention to what it called the illegal measures of the British and occasionally made promises of amendment. On 4th May 1916 Germany undertook not to sink merchant ships without warning. The whole of the year 1916 was occupied with discussion. The German naval and military staffs were at variance. The submarine campaign continued but with intermissions.

Early in 1917, after her peace proposals had been rejected, Germany announced that she would destroy all merchant ships, including neutrals, going to or coming from any of the Allied ports. She notified certain "war

areas" in the seas adjoining Great Britain, France and Italy and in the Eastern Mediterranean, leaving free certain strips of sea along which neutral ships could pass when not going to or coming from the above countries. She gave the United States leave to send across one passenger ship a week provided she was painted in very distinctive colours. And similarly as to a ship between England and Holland. This threat Germany began to carry out in February 1917. The procedure amounted to piracy pure and simple. The United States severed diplomatic relations with Germany and, when her ships were attacked, joined in the war on the side of the Allies. A prediction, made before the war had begun, that if war did break out all the world would sooner or later be drawn into it, was now well on the way to fulfilment.

Another threat made by Germany was that she would attack hospital ships crossing the North Sea except by one specified route, the allegation being that the ships were used for military purposes. She sank one hospital ship—the Asturias—in March 1917, and the Britannia and Dover Castle later. As a reprisal the open German town of Freiburg was bombarded by British and French aeroplanes.

The first step taken in order to meet the new menace was to arm all merchant ships. The arguments concerning this have been dealt with (Chap. IV. art. 5). The arming was promptly taken in hand and was carried out in due course. In the spring and early summer of 1917 the prospect for Great Britain was of the blackest. The number of ships sunk of 1,600 tons and over was often about 40 per week. Great Britain had hardly enough destroyers to protect the battleships and she had no mines with which to stop the submarines. A large proportion of the merchant ships at the disposal of the Allies were employed on naval and military work and were not

available for bringing food supplies for the people of the British Isles.

In order to take measures against the submarines Lord Jellicoe was summoned from the Grand Fleet and made First Sea Lord. Imports were restricted so that cargo space might be available for things really necessary. The loading and unloading of ships was facilitated. Shipbuilding, to replace losses, went on continually. Figures concerning it are given below. It was proposed by Sir Eustace D'Eyncourt to build merchant ships provided with the bulge, sets of engines and boilers at each end of the ship and transverse bulkheads, but it was decided that their building would take up too much time and labour. The arrangements made for merchant cargoes were not always satisfactory. The Rotarna, from New Zealand, was torpedoed in the Channel laden with about 100,000 carcases, cheese and other food; she had landed previously at Plymouth some 250 passengers, and had not been allowed to disembark her cargo, but had been ordered to proceed to another British port for this purpose. The submarines had the greatest relative success in the Mediterranean, where there were few destroyers and mines, and many coasts where submarines could find temporary or permanent bases.

By September 1917 anti-submarine measures had further developed. Some three thousand armed vessels were at work. The submarine became the hunted. It was feared that owing to the enormous increase in the consumption by the Navy of petroleum products—due to the anti-submarine measures—the stocks in Great Britain might become too low. In order to reinforce the ordinary tank vessels, many liners and other ships were fitted with double bottoms and deep tanks and the conveyance of oil fuel was given priority over everything else. This scheme was modified in 1918 in order to allow of the transport of the American troops.

By 4th May 1917, United States vessels under Vice-Admiral Sims had reinforced the British forces and soon afterwards they had reinforced the French. At first the assistance given by the United States was slight because their Navy was not well provided with vessels of the particular classes required for patrol and escort work, but American productive power soon improved the state of affairs. Hundreds of motor launches were ordered, the parts built in a marvellously short time, the boats put together at Montreal and Quebec, and then transported across the Atlantic with all their spares and equipment, ready for immediate trial on arrival. The Americans and British fought as a single force under the command of a British Admiral.

From Norway to the Orkneys is 300 statute miles. See chart in art. 1. The depth ranges up to 900 feet. Across this sea Great Britain and the United States set to work to put up a barrage of mines from the surface down to a depth of some 250 feet. In the United States a great piece of land was taken up and arrangements made to manufacture a thousand mines daily. About 100,000 mines were made and 85,000 of them were shipped. The barrage was still in progress at the time of the armistice but it is probable that a dozen submarines met their fate there.

Early in the war there were only some twenty seaplanes round the British coasts and their engines were not reliable. The German seaplanes were better, and the British lost many machines and men. It was not till late in the war that aircraft were made much use of for attacking submarines. After that, all the aircraft described in art. 4 of Chap. III. were utilised. The flying boats were based on Felixstowe and Yarmouth, were manned by a crew of four — pilot, navigator, wireless operator and engineer — carried four bombs of 100 lbs each, or

two of 230 lbs, and operated against German submarines. The positions of submarines, as fixed by directional wireless, were reported and this decided the courses of the flying boats. At first their engines were far from reliable and many descents had to be made but nearly always without loss of the boat. Flying boats brought down two Zeppelins in 1917, both pilots being Canadians. The Zeppelins kept an excellent look out and were hard to catch and could out-climb a flying boat heavily laden with petrol for the return journey. When flying boats first came into use the view obtainable through the periscope of a German submarine extended only up to 30° above the horizon. After half a dozen submarines had been sunk by flying boats the altiscope came into use and the submarines could see the sky before coming to the surface. Airships were used in some cases to escort convoys. For many months no convoy so escorted was attacked by a submarine.

In 1918 the submarine bases at Ostend, Bruges and Zeebrugge were vigorously attacked by aircraft. In the six months from April to September over 300 tons of bombs were dropped on them. The Germans had to build great concrete shelters. These were badly damaged and the submarines could still be caught while entering or leaving. The historic attack made by the British on Zeebrugge and Ostend is described separately (art. 7).

Many of the losses of submarines, were due to the carelessness of their commanders. Otherwise they would not have easily been seen by the aircraft especially in the muddy waters of the southern part of the North Sea.

The convoy system — at last introduced — went far towards defeating the submarine. "Protected sailings" were begun near the end of 1916 on the Scandinavian route. Regular convoy work was undertaken in March 1917 on the French coal trade and was shortly

afterwards extended to the Scandinavian route and to the Atlantic. The masters, officers and engineers of the merchant ships learnt how to "keep station". Want of small fast craft had prevented the earlier adoption of the convoy system. It was of incomparable use not only in the Atlantic but in the Mediterranean, where great bodies of troops were moved about. Millions of tons of shipping were convoyed. The losses were less than one per cent. A submarine attacking a convoy fired one torpedo and disappeared. The surface ships searched for her and the convoy altered course. The submarines also found convoys dangerous to attack and they concentrated on the coastal traffic. Near the coast they were hunted and fresh minefields were laid for them.

In March 1918 Brazil joined the Allies and sent warships across to European waters. During the latter part of the war the Admiralty constructed the "Shoreham Towers" two huge circular hollow structures of reinforced concrete. They could be floated to any required position and then sunk, the top remaining above water. One has been used since the war in place of a lightship. The other is being broken up. They were probably intended for use in connection with an improved barrage for the Straits of Dover but were not brought into use during the war.

The losses in British merchant shipping in the 26 months ending 50th September 1916, averaged about 95,000 tons a month or 285,000 tons a quarter. In the fourth quarter of 1916 the losses jumped up to 617,000 tons. In the four quarters of 1917 they were 912,000, 1,362,000, 953,000 and 783,000 tons respectively; in 1918 in the three quarters ending 30th September, 698,000, 631,000 and 512,000 tons respectively; in October 1918, 84,000 tons. The grand total was 9,031,828 tons.

The loss in foreign merchant shipping in any quarter was generally some two-thirds of that of the British loss and the total for the whole war period was just two-thirds, or 6,021,958 tons. The world's loss was thus 15,053,786 tons. All the above figures include loss from ordinary "marine risks", though this formed only a minute fraction of that from "enemy action". The figures do not include the losses of enemy countries, but they had few ships on the seas.

The output of merchant ship-building in the United Kingdom during the war averaged some 270,000 tons a quarter — it fluctuated greatly and was most in the latter part of the war — and the total output was 4,342,296 tons. In other countries — including enemy countries — it was 6,507,231 tons. The grand total was 10,849,527 tons.

In Great Britain the net result of the destructions and output would have been a loss of 4,689,532 tons, but she had captured 716,520 tons in the war — of this 654,037 tons was in August 1914 — and purchased 530,000 tons from foreign countries, so that her net loss was 3,443,012 tons.

In other countries (Dominions, Allies and neutrals) the net result of the destructions and output was a gain of 485,273 tons but they also captured 1,656,155 tons in the war so that their net gain was 2,141,428 tons. Of these countries by far the most important was the United States which built largely and obtained some 700,000 tons of the Central Powers' shipping which lay in her ports when she joined in the war.

In considering the net result to the world the above captures and purchases of ships must be excluded. The British loss of 4,689,532 tons, less the gain in other countries of 483,273 tons, gives a net loss of 4,204,260 tons. Of this about one million tons was sailing ships.

The following extract from Lloyd's Register of Shipping shows the pre-war and 1922 figures for the world including the enemy countries. It omits of course small non-seagoing vessels. It gives the tonnage of steel and iron ships propelled by steam or by motor. It omits sailing ships — which amount to some 3 million tons — and wooden ships which were largely built during the war but are not of great permanent value.

Country.	June. 1914.	June. 1922.
	Tons gross.	Tons gross.
United Kingdom	18,877,000	19.053.000
British Dominions . . .	1,407,000	2,201,000
United States	1,837,000	12,506,000
Austria-Hungary	1,052,000	Nil
Denmark	768,000	944,000
France	1,918,000	3,303,000
Germany	5,098,000	1,783,000
Greece	820,000	653,000
Holland	1,471,000	2,613,000
Italy	1,428,000	2,600,000
Japan	1,642,000	3,325,000
Norway	1,923,000	2,337,000
Spain	883,000	1,187,000
Sweden	992,000	996,000
Other Countries	2,398,000	3,301,000
Total Abroad	23,637,000	37,749,000
World's Total	42,514,000	56,802,000

The tonnage of Great Britain and the Dominions has increased slightly since 1914. In 1914 it was nearly

½ (47.8 per cent) of the world's tonnage. It is now about ⅜ths (37.3 per cent). For Great Britain alone the figures are 44.5 and 33.5 per cent. Germany has increased her tonnage by 1,131,000 tons during the past year.

Under the auspices of the Admiralty a great salvage organization was built up. The vessels used were chiefly converted gunboats. There was a powerful pumping installation. Some 440 merchant vessels were salved.

Many of the German pre-Dreadnought battleships were scrapped and the materials used for building submarines, but the building was greatly hindered by the heavy repairs which had to be effected to the ships damaged at Jutland Bank and by the large number of mine-layers which had to be built owing to the extensive British mine-laying operations in the North Sea in 1916.

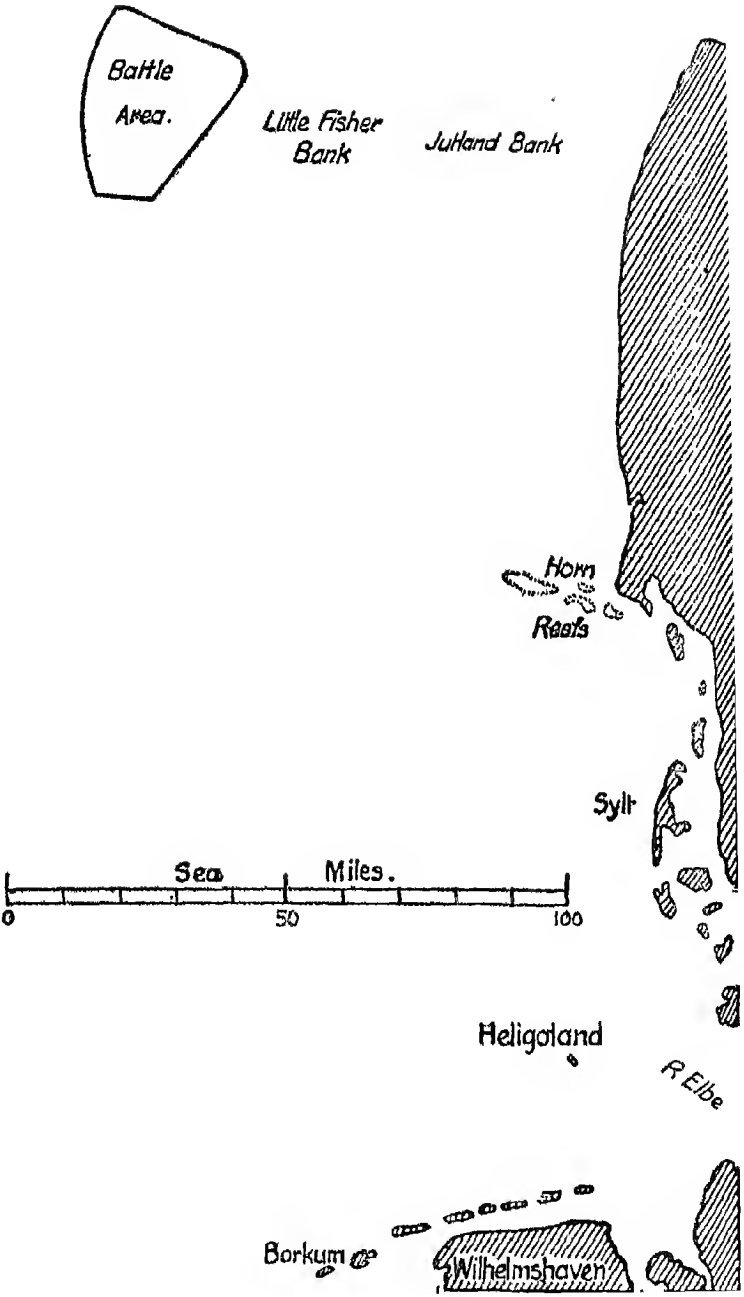
The number of German submarines existing at the outbreak of war was about 25, the number built during the war 360 and the number surrendered after the close of the war 175. This leaves 210 as the number destroyed. Of this total about 10 were lost or destroyed by the Germans themselves after the armistice. Thus 200 is the number destroyed by Allied action in the war. The number of submarines operating at one time was at first small but it increased steadily. So also did the rate at which they were built. The approximate numbers destroyed were: — 5 in 1914, 20 in 1915, 25 in 1916, 67 in 1917, 83 in 1918.

The success of the convoy system has been mentioned but it resulted in the saving of merchant ships rather than in the destruction of submarines. The increased number of destructions of submarines towards the end of the war, was due to the increased use of mines and to the incessant hunting to which the submarines were subjected by the masses of craft of all kinds — including aircraft — collected against them. It must however

be remembered that in the later stages of the war the number of German submarines at work had greatly increased and that this would naturally lead to more casualties among them. It cannot be said with certainty that if Germany had not lost the war on land she would have been defeated in her submarine campaign. Admiral Scheer states that during 1918 the number of submarines built (probably completion is meant) was 74. Thus the submarines were probably being sunk more rapidly than they were being built, but there were no less than 185 in existence in November 1918, and it is not of course known how quickly more could — in the absence of Germany's defeat on land — have been built.

Art. 6. The Battle of Jutland Bank. *Meeting of he advanced forces.* The Grand Fleet put out for one of its periodical sweeps through the North Sea. It left Scapa Flow on the evening of 30th May 1916. About the same time, Vice-Admiral Sir David Beatty with six battle cruisers put to sea from Rosyth. With him was also the 5th Battle Squadron under Rear-Admiral Evan-Thomas. A rendezvous was fixed. Beatty was to be in latitude 56° 40′ N., longtitude 50° 0′ E., at 2 p.m. on the 31st and to stand to the north to meet the Grand Fleet.

Thus it was that at 2-30 p.m. Beatty was steering north by east. Spread out from west to east was a screen of light cruisers some dozen in number, the starboard ship being the Galatea. It was the Galatea which at 2-30 p.m. reported to the Vice-Admiral the presence of enemy ships. In a few minutes more he heard that the enemy was in strength. He steered for Horn Reef — S. S. E. — so as to cut the enemy off from his base (see accompanying map) and he sent up a seaplane to scout and report. Soon the smoke of the enemy ships was discerned to the north-east, and it was clear that


Battle
Area.
Little Fisher
Bank
Jutland Bank
Horn
Reefs
Sylt
Sea Miles.
0
50
100
Heligoland
R. Elbe
Borkum
Wilhelmshaven

they could not get away without being brought to action. It was known to the British that the enemy, in order to get home, used a channel kept clear of mines near Horn Reef. Beatty changed his course to east and then to north-east. At about 3-30 p.m. he sighted the enemy — Von Hipper's five battle cruisers — distant 23,000 yards.

Beatty's flagship was the Lion. With her were the Tiger and Princess Royal. The Queen Mary, New Zealand and Indefatigable formed the 2nd squadron. A few miles away was the 5th Battle Squadron, four fast battleships of the Queen Elizabeth class. The German ships were the Lutzöw, Derfflinger, Seydlitz, Moltke and Von der Tann in the order named [1]. For details of all the ships and also of the main battle fleets see the lists given below.

On the accompanying charts (Figs. 13 and 14) the courses of the enemy squadrons are shown in dotted lines, those of the British battleship squadrons in continuous thick lines — dotted when the ships manoeuvred and separated — of British battle cruiser squadrons in thin lines. The charts refer to the action subsequent to 6 p.m. Passages in inverted commas are quotations from Vice-Admiral Beatty's report.

On sighting the enemy, Beatty formed line of battle with his two squadrons, altered course to east, slightly converging on the course of the enemy, and increased speed to 25 knots. The time was now about 3-40 p.m. The sun was behind the British ships, the visibility good, the wind south-east. The British battle cruisers were formed on a "line of bearing" — parallel courses but each ship clear of the others as to broadside firing — to clear the smoke, the 2nd light cruiser squadron taking

[1] Admiral Scheer who commanded the German battle fleet, states that the order was Seydlitz, Molkte, Derfflinger, Lutzow, Von der Tann The two ships originally leading were badly hit and probably fell astern

station ahead, while the 1st and 3rd light cruiser squadrons formed a screen to the eastward. Destroyers also took station ahead. The 5th Battle Squadron was 10,000 yards away to the N. N. W. The battle fleet was some 50 miles beyond them. The wireless reports had reached it and it was coming on at full speed. This was 20 knots.

The Battle Cruiser Action. At 3-48 p.m. fire was opened by both sides — the range being 18,500 yards — and Beatty reduced speed to 21 knots to enable the 5th Battle Squadron to close. The mean direction of the course of the British battle cruisers then became S.S.E., the enemy's course being roughly parallel and the range 19,000 to 12,000 yards. The enemy was to the eastward of the British. Both sides steered zig-zag courses, the ranges rapidly altering. The enemy was making for his Battle Fleet. His position was abaft of the Lion's beam. Never before had such big ships met in conflict, never before had so many great guns fired across blue water. The gunnery on both sides was excellent. The British ships were hit from the commencement of the action. The fight was a great one, open and free from confusion. They ran parallel, the two lines of great ships, each ship the product of genius and high skill, each line led by a master of his art, each gun served by experts who could hit one another's ships at ten miles. At 4 p.m. the roof of the Lion's after turret was blown off and the two guns in it put out of action. It is not necessary to give a chart of this part of the battle. The 5th Battle Squadron came nearly in Beatty's wake. After Beatty and the enemy turned northward (see below) the ships again ran in nearly parallel lines, and again they zig-zagged.

At 4-6 p.m. there was seen — by the enemy as well as by the British Battle Squadron coming down in sup-

port — a great column of smoke at the rear of the line. When it cleared away the Indefatigable had blown up and disappeared. Almost everyone on board was lost. Two salvoes had just hit her, the first one striking her at the outer edge of the deck and exploding a magazine. The range was about 16,000 yards.

At 4-8 p.m. the 5th Battle Squadron came into action. The range was a long one, 20,000 yards. At 4-15 p.m. twelve of the British destroyers made for the enemy to attack him with torpedoes. The enemy made a similar attack, their force consisting of a light cruiser and fifteen destroyers. The two forces met and a fierce engagement ensued. Each side had two destroyers sunk and finally retired on their battle cruisers. Of the British destroyers Nestor and Nomad had pressed home their attack on enemy ships and compelled them to turn away.

From 4-15 to 4-43 p.m. the conflict raged fiercely. The 5th Battle Squadron was engaged, but still at a very long range. "Our fire began to tell, the accuracy and rapidity of that of the enemy depreciating considerably." At 4-18 p.m. the Seydlitz was on fire. The visibility to the north-east-ward had become worse and the outline of the ships very indistinct. At 4-26 p.m. the Queen Mary, struck by a salvo, blew up and disappeared. The range was probably about 13,800 yards. There were twelve survivors.

At 4-38 p.m. the presence of the enemy Battle Fleet ahead was reported by the cruiser Southampton. At 4-42 p.m. it was sighted from the Lion, bearing S. E. "Course was altered 16 points in succession to starboard" and Beatty then "proceeded on a northerly course to lead the enemy towards the Battle Fleet. The 5th Battle Squadron were now closing on an opposite course and engaging the enemy battle cruisers with all guns".

At 4-57 p.m. they turned up astern of Beatty and came under the fire of the leading ships of the enemy Battle Fleet.

At 4-52 the enemy battle cruisers turned. They were about to meet the German Battle Fleet. They took station ahead of it and the whole line ran northward, nearly parallel to the line of British ships.

"The weather conditions now became unfavourable, our ships being silhouetted against a clear horizon to the westward, while the enemy were for the most part obscured by mist, only showing up clearly at intervals." The British battle cruisers had, in fact, to cease fire for a time. They also drew away from the 5th Battle Squadron, whose rear ships engaged the German battleships but were for half-an-hour unable to see them though fired on by them continuously.

"At 5-35 p.m. our course was N. N. E., and the estimated position of the Battle Fleet was N. 16 W., so we gradually hauled to the north-eastward, keeping the range of the enemy at 14,000 yards. He was gradually hauling to the eastward, receiving severe punishment at the head of the line."

At 5-56 p.m. Beatty having sighted the starboard column of the Grand Fleet — it bore north four miles — turned eastward and "proceeded at utmost speed." His object was to fling himself across the head of the German line thus "crossing the T" and at the same time getting out of the way of the Grand Fleet so that it could come in astern of him. The Lion's position at 6 p.m. is shown in Fig. 13. About this time the armoured cruisers Defence (Rear-Admiral Sir R. Arbuthnot) and Warrior, coming in advance of the Grand Fleet and chasing the light cruiser Wiesbaden, crossed the Lion's track. Hit by salvoes from the enemy battle cruisers, the Defence blew up and the Warrior was damaged and

afterwards sank. The Black Prince of the same squadron was sunk during the night.

The 3rd Battle Cruiser Squadron — Invincible (flag) Inflexible and Indomitable — had also come in advance of the Grand Fleet. It was — together with four destroyers — attacking enemy light cruisers and was at first in ignorance of Beatty's position. Beatty sighted it at 6-21 p.m. By his orders it took station ahead of him, the manoeuvre being magnificently executed by Rear-Admiral the Hon. H. L. A. Hood. The battle with the enemy battle cruisers and leading battleships raged furiously. One of the Invincible's turrets was pierced by a shell, a magazine exploded and she broke in half and sank. There were few survivors.

British ships at Jutland Bank.
(The speeds are the designed speeds.)

28 Dreadnoughts or Post-Dreadnoughts.

4 ships (Queen Elizabeth class) of 27,500 tons, 25-knot, 8 guns (15-inch), belt 13 inches.

2 ships (Royal Sovereign class) of 25,750 tons, 21-knot, 8 guns (15-inch), belt 13 inches.

3 ships (Iron Duke class) of 25,000 tons, 22-knot, 10 guns (13.5-inch), belt 12 inches.

3 ships (King George V class) of 23,000 tons, 22-knot, 10 guns (13.5-inch), belt 12 inches.

4 ships (Orion class) of 22,500 tons, 21-knot, 10 guns (13.5-inch), belt 12 inches.

1 ship (Canada)* of 28,000 tons, 23-knot, 10 guns (13.5-inch), belt 9 inches.

1 ship (Erin)* of 29,000 tons, 21-knot, 10 guns (13.5-inch) belt 12 inches.

3 ships (Colossus class) of 20,000 tons, 21-knot, 10 guns (12-inch), belt 11 inches.

* Built for foreign Governments and taken over during the war.

3 ships (St. Vincent class) of 19,250 tons, 21-knot, 10 guns (12-inch), belt 10 inches.

3 ships (Bellerophon class) of 18.600 tons, 22-knot, 10 guns (12-inch), belt 10 inches.

1 ship (Agincourt)* of 27,500 tons, 22-knot, 14 guns (12-inch) belt 9 inches.

9 Battle Cruisers (3 lost).

4 ships (Lion 26,350, Tiger 28,000, Princess Royal 26,350, Queen Mary 27,000 tons) 28-knot, 8 guns (13.5-inch) belt 9 inches.

2 ships (Indefatigable, N. Zealand) of about 18,750 tons, 25-knot, 8 guns, (12-inch) belt 7 inches.

3 ships (Invincible, Inflexible, Indomitable) of about 17,250 tons, 26-knot, 8 guns (12-inch) belt 7 inches.

8 Armoured Cruisers (3 lost).

26 Light Cruisers.

78 Destroyers (8 lost).

British Losses at Jutland Bank.

3 Battle Cruisers, 63,000 tons.

3 Armoured Cruisers, 41,700 tons.

8 Destroyers, about 8,300 tons.

Total 113,000 tons.

German ships at Jutland Bank.

(The speeds are the designed speeds).

16 Dreadnoughts.

4 (König class) of 25,400 tons, 21-knot, 10 guns (12-inch) belt 14 inches.

4 (Kaiser class) of 24,300 tons, 21-knot, 10 guns (12-inch) belt 13¾ inches.

4 (Heligoland class) of 22,500 tons, 21-knot, 12 guns (12-inch) belt 11¾ inches.

* Built for foreign Governments and taken over during the war.

4 (Nassau class) of 18,600 tons, 21-knot, 12 guns (11-inch) belt 11¾ inches.

5 Pre-Dreadnoughts (1 lost).

5 (Deutschland class) of 13,040 tons, 20-knot, 4 guns (11-inch) belt 9½ inches.

5 Battle Cruisers (1 lost).

2 ships (Lützow, Derfflinger) of 26,200 tons, 27-knot, 8 guns (12-inch) belt 12 icnhes.

1 ship (Seydlitz) of 24,600 tons, 10 guns (11-inch) belt 12 inches.

The above three ships had also 8-inch armour on the side above the belt.

1 ship (Moltke) of 22,640 tons, 10 guns, (11-inch) belt 7.5 inches.

1 ship (Von der Tann) of 18,700 tons, 8 guns (11-inch) belt 7.5 inches.

1 Armoured Cruiser.

11 Light Cruisers (4 lost).

77 Destroyers (5 lost).

German Losses at Jutland Bank.

1 Battleship (Pommern) of Deutschland class 13,040 tons.

1 Battle Cruiser (Lützow) 26,200 tons.

4 Light Cruisers (Wiesbaden, Frauenlob, Elbing, Rostock) and 5 Destroyers about 20,750 tons.

Total 60, 000 tons.

The Grand Fleet Action. The Grand Fleet coming on in six divisions, line abreast, had to "deploy" and get into line of battle. Its course was S. E. by S. Each division consisted of four ships. The letters near the upper left hand side of Fig. 13 indicate the division leaders

King George V, Orion, Iron Duke (flagship), Benbow, Colossus and Marlborough. The battle cruisers were headed by the Lion, the 5th Battle Squadron by the Barham. The decision as to the direction of deployment was reached about 6-8 p.m. If the Fleet had deployed on its starboard division, it would have followed more or less in Beatty's track. The 5th Battle Squadron was preparing to take station ahead of it. But the Grand Fleet deployed

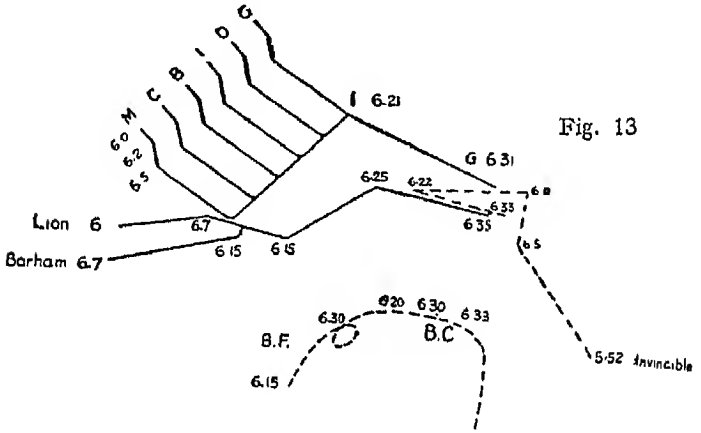
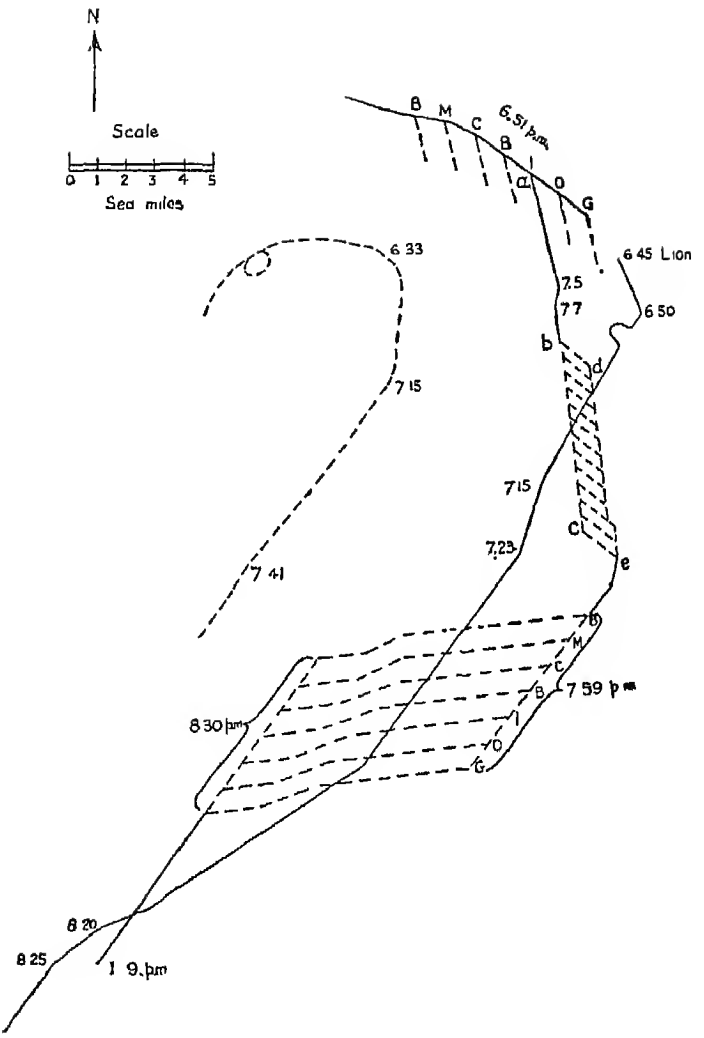


Fig. 13

on its port division, five miles to the northward, and the 5th Battle Squadron — three ships — swept round and took station astern of it. The Warspite's helm had become jammed and she had, involuntarily, gone round in a semi-circle towards the enemy Battle Fleet and back, engaged all the time. She then fell out of the line for repairs. During the deployment the speed of the Grand Fleet was reduced to 14 knots in order that the battle cruisers might draw clear. After the deployment it was increased to 17 knots. After 6 p.m. although the visibility became reduced, it was more favourable to the British than to the enemy. The enemy battle cruisers turned in a complete circle to allow their battle fleet to come up.

The enemy line then turned due east. Beatty and Jellicoe turned south-east, the latter passing the wreck of the Invincible. While the deployment of the Grand Fleet was going on, the two starboard divisions became engaged with enemy battleships, then the two central divisions with the Königs and, lastly the two port divisions with the enemy battle cruisers and leading battleships. The succeeding events, though of great importance, need but few words. The enemy had lost both heart and nerve. Only the mist saved him from destruction. "The head of his line was crumpled up, leaving battleships as targets for the majority of our battle cruisers." His ships, when they could be seen were hit. The British ships were scarcely hit. They also evaded the enemy torpedoes, except for a hit on the Marlborough whose maximum speed became reduced to 17 knots. The speed of the Grand Fleet was kept the same. The German ships turned south. At 6-51 p.m., the British ships made a similar turn and, in order the quicker to close the enemy, made it by divisions. See dotted lines near the top of Fig. 14. The subsequent courses of the individual ships are not shown on the chart, but the line *ab* shows the track and times of the Iron Duke. The other tracks were at first parallel to this, but by 7-15 p.m. all the ships were again in line ahead. The Lion and the other battle cruisers were in advance and kept nearer the enemy. The enemy, still being shelled, sent out destroyers and launched a torpedo attack, the German battle cruisers also turning towards the British line. The British ships evaded the torpedoes by turning away. The average turn was 4 points. It was made by half-divisions, the positions of the ships being *bc* at 7-21 p.m. and *de* at 7-33 p.m. During the turn twenty torpedoes crossed the British line. The ships were again in line ahead by 7-41 p.m. Meanwhile, the German ships under cover of a smoke screen had disap-


N
Scale
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Sea miles
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6.51 p.m.
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C
B
7.59 p.m.
I
O
G
8.30 p.m.
8.20
8.25
1 9.p.m.

Fig. 14

peared westwards into the mist. Beatty with his battle cruisers regained touch, and again shelled the enemy, but lost it again in the mist and failing light.

Admiral Jellicoe decided against attempting a night attack. He avoided following in the enemy's wake and, perhaps, running onto mines. He moved southward, so as to cut them off from the swept area near Horn Reef, which they must pass through, and he sent destroyers to lay mines in that area. During the night eleven explosions were heard as enemy ships ran into the mines, though Scheer states that so far as known there were no losses from these mines. During the night light cruiser and destroyer actions took place, the Germans losing the light cruiser Frauenlob, the British three destroyers. Several German big ships were torpedoed, the battleship Pommern being sunk. In the morning no enemy ships were found. They had escaped through the rear of the British Fleet.

Sir Percy Scott has stated, in a speech, that while the battle was in progress the Harwich force of destroyers was sent out by the Admiralty. They were aware that a battle with the High Seas Fleet was going on, and it had been arranged with Admiral Jellicoe that in such an event the destroyers would be sent out. When part of the way across the North Sea they were recalled by wireless. Some one at the Admiralty, said Sir Percy, made a terrible blunder; but it is doubtful whether the destroyers could have arrived in time.

Comments on the Battle. At Jutland the enemy came out to make a raid on shipping between England and Norway. The battleships and battle cruisers were to act as a support for the raiding cruisers. The enemy's good luck in sinking two battle cruisers encouraged him to follow Beatty in the hope of sinking more of them.

A list of the battleships, battle cruisers and cruisers which took part in the battle of Jutland Bank has been given above together with information as to armament and armour, and of losses of ships. On the British side there were 28 battleships, 9 battle cruisers, 34 cruisers and 78 destroyers; on the enemy side, 21 battleships, 5 battle cruisers, 12 cruisers and 77 destroyers. The causes of the British losses in battle cruisers were:

(a) The enemy's "delay action" fuse which causes the explosion of the shell to be delayed till the shell has gone through the armour;
(b) The generally thinner armour of the British ships;
(c) The defective arrangements in them for preventing the flashes of exploding shell from reaching the magazines;
(d) The concentration of fire on one ship by more than one of the enemy;
(e) The steep angle at which the shells fell on the thinly armoured decks or the thin turret roofs.

As to (c) the ranges of the Indefatigable and Queen Mary when destroyed were, respectively, some 16,000 and 13,800 yards. The shells striking the Indefatigable would be 11-inch — she is said by Scheer to have been sunk by the Von der Tann — those striking the Queen Mary may have been 11-inch or 12-inch. Two enemy ships were firing at the former, while the New Zealand next in front of her was scarcely hit at all. There was also concentration on the Lion. It is said that she was badly damaged and came near to sharing the Queen Mary's fate. As to the Invincible, the range was only about 8,600 yards. The enemy's 5.9-inch guns would be firing. The shell would be numerous and fall steeply. The Invincible would be selected because she carried an Admiral's flag and was the ship which had sunk the Scharnhörst. After the battle, the strengthening of the

deck armour of battleships and battle cruisers was taken in hand and better anti-flash arrangements made. Sir Percy Scott, several years before 1914, seeing the high elevation of the German guns and foreseeing what would happen, had some experiments made on an armoured hulk, but money could not be obtained to plate the hulk with the hardest armour, and the experiments ceased. He states ("Fifty Years in the Royal Navy") that the information we should have obtained, we got at Jutland by the loss of our ships.

The German big ships were divided into compartments which were in some parts of the ship smaller than in British ships but in other parts not so small. On the whole there was not much difference. Each door had quick-action clips, i. e. clips so arranged that closing one clip closed the others. The Germans had a somewhat complicated system of flooding the compartments and a special officer to see to the trim and safety of the ship, and this was probably the reason why some of their badly damaged ships were saved. (Sir Eustace D'Eyncourt. Paper read at Institution of Naval Architects, 1922) The German battle cruisers were fired on for more than half an hour by the thirty-two 15-inch guns of the 5th Battle Squadron. The Derfflinger and the Seydlitz received terrible maulings — they had some also at the Dogger Bank action — but they did not sink and were repaired in six months. The Lützow, though badly damaged by gunfire, was hit by a torpedo after the arrival of the Grand Fleet. She was finally sunk by the enemy, when they found they could not get her to port. An officer of the Lützow stated that she would have got home — like the others — if her crew had not been new to her.

That the German gunnery would be excellent was to be expected. With a fleet whose object was the overthrow of Great Britian, but whose numbers were never allowed

by Great Britain to equal her own, it was not likely that a careful and scientific people would leave anything to be desired in the matter of gunnery. They had an extremely good range-finder. In the early part of an action their shooting was excellent. It is when a German ship is hammered by an enemy that the gunners, losing nerve, fall off in their aim. It is known that the Germans made long and careful experiments in gunnery. They used old ships for targets, and did not spare expense. They were adepts at bunching their salvoes. The advantages of very big projectiles are accuracy in shooting and great destructive effect. But the smaller projectile has its points. The gun can be fired more quickly. A greater number of guns can be carried. The total number of shells fired per minute is greater. And the steep angle of drop has the advantages already explained, provided the range is suitable and the deck armour thin.

Lord Jellicoe was disagreeably surprised to find that the ships of the König class could steam at 23 knots. He had merely been told that their designed speed was 20.5 knots. In Brassey's "Naval Annual" published about June 1916, the designed speeds were given as 22 knots. Lord Jellicoe must also have been disagreeably surprised when he found out the comparatively small extent of the German losses. In his despatch several of their big ships which were not sunk were reported as "seen to sink", or as so much damaged that they could not get to harbour, and the total German loss in tons was calculated as being about equal to the British loss.

As to the handling of the British ships there has been great controversy. A destructive criticism of Admiral Jellicoe's tactics has been made by Commander Carlyon Bellairs, M.P. ("The Battle of Jutland. The Sowing and the Reaping"). Since then the matter has been discussed by high naval officers and others. It has been argued

that the Grand Fleet should have deployed on its starboard column and so obtained far quicker contact with the enemy and taken them by surprise. But Admiral Jellicoe considered the probability of destroyers being ahead of the German Fleet — they would have been a very serious danger during deployment — and also of the German Fleet passing between him and Beatty, and crossing his T. Also some of his less thickly armoured ships would have been exposed to enemy fire during deployment. It is impossible to say that Admiral Jellicoe was wrong and it is probable that he was right.

As regards correctness of abstention from a night attack Vice-Admiral Beatty agreed with Admiral Jellicoe. The enemy had star-shells and generally better arrangements than the British for night fighting. As to Admiral Jellicoe's turn-away manoeuvre to avoid the torpedoes, it has been argued with great force, that the Grand Fleet was there to fight the enemy and that a turn towards him would have enabled touch with him to be kept, the torpedoes being still avoided. But the turn-away manoeuvre had been deliberately decided on beforehand —in consultation with the Admiralty—and practised during exercises.

In further defence of caution it has been argued that the German Fleet when shut up in its harbour was as useless as if it had been destroyed. This idea is untenable. A " fleet in being " is not useless. Jellicoe's detractors say that, but for the German Fleet, British ships could have gone in and blocked the Elbe, the submarine bases could have been destroyed and the submarine campaign put an end to. This is denied by other naval officers of experience. The matter is highly controversial. If the German Fleet had been destroyed the destroyers and submarines attached to the Grand Fleet could have been used for anti-submarine work.

In his comments on the handling of the Grand Fleet, Commander Carlyon Bellairs states that with the line-abreast formation adopted and the Iron Duke near the centre, she could not lead whichever way the fleet deployed, that with the old "phalanx" formation (Fig. 15) deployment would at once bring 14 ships into action with the flagship leading, and that the flagship ought to see the situation of its own engaged ships first. The figure shows the number of ships (24) actually present, the flagship being the leading ship in the central line. Commander Bellairs sketches some other possible formations but their advantages are not very apparent.

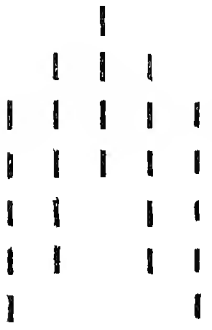

Fig. 15

The general decision must be in favour of Admiral Jellicoe's tactics. At the deployment the decision had to be made quickly, at the turn-away instantly. There was no previous experience of battles of this kind. The degree of danger from torpedoes was unknown. The same is true as to mines and submarines. In war the unexpected happens. Who would, for instance, have anticipated that in an action between five German battle cruisers and six British, with four battleships in support, two British ships would be sunk and none of the German? There could be no gambling with the Grand Fleet. It must never be forgotten that the British Fleet had already the command of the sea. Any change in that command was to the advantage of the Germans and not of the British. Suppose that needless risk had been run in order that there might be a non-existent German Fleet instead of a merely impotent one. Suppose that the British had suffered such losses as to give the command of the sea to Germany. The war would have been lost absolutely.

In emergencies or complicated operations in which

several persons are concerned, the necessity for prompt transmission of information from one person to another is liable to be neglected. At Jutland Bank there were several instances of the lack of such transmission. Some have been mentioned in the preceding narrative. Rear-Admiral Arbuthnot, from want of knowledge, closed the enemy with his cruisers. The Invincibles lost their way. The loss of the Indefatigable and Queen Mary was not known to Admiral Jellicoe till next day. One great lesson to be learnt from the battle—this was pointed out by Major-General Aston and Lord Selborne at a lecture in London—is that arrangements for the transmission of information should be drastically improved.

It has been remarked by a writer on naval affairs that, in view of the relative losses, it is not surprising that the Germans claimed the result of Jutland Bank as a victory. But they left out of account the fact that several of their ships took six months to repair and that immediately after the battle they were so weak—some of their big ships limping homewards and some being short of ammunition—that they could not possibly have faced a renewal of the fight, that they had to run for their ports and that the High Seas Fleet never again let itself be caught by the Grand Fleet.

Admiral Scheer's account of the battle makes amusing reading. He says that he never broke off the action or tried to do so. He was "pursuing" the British, most of the time. Totalling up the tonnage lost on either side he claims a "Victory." He says that the British Navy is no longer irresistible. A German Officer has described the "escape of the German Fleet as due to skilful handling and good luck." He adds that at first the German seamen were full of hope, but after the action nothing would have made them again face the Grand Fleet. When ordered to do so in 1918 they mutinied.

Professor Hovgaard says: — "The action, although of gigantic proportions, was but the introduction to a decisive battle, which did not take place on account of the weather conditions, and which could not have ended otherwise than fatally to the German Fleet."

Admiral Scheer states that from the 23rd May, he set all the available German submarines—the attack on commerce being suspended for the purpose—to watch the main British naval bases in the North Sea. As soon as the weather was favourable for aerial reconnaissance, he proposed to advance with his Fleet and compel the British to put to sea and so to give battle under conditions favourable to himself. He hoped thus to bring the submarines into action and at the same time to utilize them for reconnaissance purposes. Neither of these hopes was fulfilled. For a week he waited for favourable atmospheric conditions. They did not occur and on 31st May, when it was impossible to keep the submarines off the enemy ports any longer, he had to put to sea. For what he considered to be the more formidable of his two plans, extended scouting by airships was necessary. This plan he had to abandon. But the submarines did not fulfil the other plan. They did not see the exit of any considerable part of the Grand Fleet, and such reports as they sent in concerning the movements of individual units gave no indication of the British Commander-in-Chief's intentions. Neither during the battle nor before it did the submarines do anything.

Note. On the night of 18th August, 1916, the German High Sea Fleet—excepting several big ships still under repair—again came out. Scheer says it was with the intention of bombarding Sunderland at sunset next day, if there was "no collision with the enemy." At 5.30 a.m. on the 19th, his cruisers and fast battleships, which were twenty miles ahead of the Fleet, manoeuvred to

avoid a British submarine. At 7-5 a.m. the submarine torpedoed the battleship Westfalen which had to go back. Scheer had eight zeppelins scouting. He asserts that he continued westwards till 2-23 p.m when he swerved, hoping to meet the Harwich destroyers which he heard were out, but he turned back at 4-35 p. m. because it was "too late to bombard Sunderland." Owing to the large number of submarines which were sighted, Jellicoe suspected that the High Sea Fleet was out, and made a sweep to the south with the Grand Fleet. Two of his advanced light cruisers, Falmouth and Nottingham, were torpedoed and sunk by enemy submarines, Falmouth being hit twice and her assailants destroyed, one by ramming one by a depth-charge. A mine-field was suspected and this caused Jellicoe to alter his course — at first it was reversed — so that he did not succeed in cutting off the enemy fleet.

Scheer states that the German policy was to make frequent advances of the German High Sea Fleet into the North Sea so as to induce the British to operate there. He states that six such advances were made from February to May 1915, but actually none of them extended to over 120 miles from Heligoland. Their real object was to wear down the British Fleet by mine and torpedo.

Art. 7. Some later events. *Raids on the British Coast.* In 1917 several raids were made by destroyers. There was one on the Suffolk coast in January and one on the Kentish coast in March; neither of them did any damage. In April, Yarmouth, Lowestoft and Ramsgate were bombarded and damaged. In the same month Dunkirk was bombarded and a French torpedo boat which, with British and French patrol boats, attacked the raiders, was sunk.

The Belgian Coast. On 12th May 1917, Zeebrugge was

subjected to a bombardment which was heavier than any previous one. The firing was very plainly heard at Dover and Deal. Aeroplanes took part in the attack. Further bombardments of Belgian ports and works took place in June 1917, aircraft playing a great part. Owing to the shallow water there was, all along, much difficulty in dealing drastically with Zeebrugge. The destroyer raids mentioned above and below, all had their bases there, and during their occurrence two British destroyers were lost.

The destroyer fight in the channel. On the night of 20th April 1917, six German destroyers were engaged in the Channel by the flotilla leaders Swift and Broke. The following narrative is extracted from the official report:

The Swift and Broke on night patrol in the Channel on 20th April, were proceeding on a westerly course when, at 12-40 a.m., the Swift sighted an enemy flotilla on the port bow, proceeding in the opposite direction at high speed. The night, though calm, was intensely dark, and when first sighted the enemy were within 600 yards range. Simultaneously the fire-gongs on board the German destroyers were heard to ripple down the line, and in a blaze of flashes they opened fire.

Commander Ambrose M. Peck, instantly decided to ram the leading enemy destroyer. The wheel was wrenched round. The Swift missed but turned and, in turning, neatly torpedoed another boat in the line. Again she dashed at the leading boat, which once more eluded her and made off into the darkness with the Swift in pursuit.

The Broke had been steaming astern of the Swift. Upon the latter altering course to ram the leader, the Broke launched a torpedo at the second boat in the line, which hit her, and then opened fire with every

gun that would bear. Holding her course for a moment to gather speed for the blow, the Broke swung round to port and rammed the third boat at full speed, fair and square abreast the after funnel.

Locked together thus, the two boats fought a desperate and hand-to-hand conflict. The Broke swept the enemy's decks at point-blank range with every gun from main armament to pom-pom, maxim, rifle and pistols. The remaining two German destroyers poured a devastating fire upon the Broke. The foremost guns' crews were reduced from eighteen men to six, and Midshipman Donald A. Gyles, R. N. R., in charge of the forecastle, though wounded in the eye, kept all foremost guns in action, himself assisting the depleted crews to load. While he was thus employed a number of frenzied Germans swarmed up over the Broke's forecastle out of the rammed destroyer, and swept aft in a shouting mob. The midshipman was grappled by a German, who was promptly bayoneted by a seaman. The remainder of the invaders, with the exception of two who lay down and feigned death, were driven over the side.

Of the original six German destroyers, there were now three remaining in the line. Two minutes after ramming, the Broke succeeded in wrenching herself free from her sinking adversary, and turned to ram the last boat in the line. She failed in this, but, as she swung round, succeeded in hitting this boat's consort on the stem with a torpedo. Engaged with these two fleeing destroyers the Broke attempted to follow the Swift in the direction in which she was last seen; a shell, however, struck the Broke and disabled her main engines. The enemy was then lost to sight in the darkness.

Still carrying considerable way, the Broke headed in the direction of a destroyer heavily on fire, whose crew

sent up loud shouts for mercy. She was burning fiercely, and regardless of the danger from her magazines exploding, Broke steered towards her. The German unexpectedly opened fire. Broke, being then out of control and unable to extricate herself, silenced the treachery with four rounds, and then, to ensure her own safety, fired a torpedo, and hit the German destroyer amidships.

In the meantime the Swift had continued her pursuit of the leading boat until injuries she had received earlier prevented her from maintaining full speed. She thereupon turned in search of a fresh quarry. The outline of a stationary destroyer was sighted in the darkness. It was the sinking German destroyer that had been rammed by Broke. The German crew were bellowing in unison "We surrender! We surrender!" but their ship heeled slowly over, while her ship's company hastily took to the water, and sank stern first.

In this action the Germans lost 2 if not 3 destroyers with their crews. The British casualties were comparatively light.

Scraps in and around Heligoland bight. In the latter part of 1917, British craft — to quote Sir Eric Geddes — went daily into, over or under the Heligoland Bight. They were a sore trial to the enemy.

Light naval forces scouting in the Bight, sighted on the morning of 18th August 1917, an enemy destroyer and — a little later — some mine-sweepers, fired on them, chased them, set the destroyer on fire and severely damaged two of the mine-sweepers. But all escaped through the mist. Two submarines attacked the British vessels, but without result.

On 1st Sept. 1917, off the coast of Jutland, the 4th Light Cruiser Squadron and the 15th Destroyer Flotilla

with six other vessels, came on four enemy mine-sweeping destroyers, drove them ashore, and destroyed them by gunfire.

On 11th and 12th Sept. 1917, British Naval aircraft, after bombing Thourout aerodrome, Bruges dock and Zeebrugge sheds and mole, hit a large destroyer stationed alongside the mole. Four days later they bombed ships between Ostend and Blankenberghe, hitting a large destroyer and sinking one or two trawlers.

Six British and French destroyers, patrolling off the Belgian coast on 27th October 1917, met and attacked three German destroyers and 17 aeroplanes, hit the destroyers twice, drove them under the protection of the land batteries and broke up the formation of the aeroplanes which dropped bombs with little result.

On the 2nd November 1917, British destroyers, having penetrated into the Kattegat, fell in with the Krokodil, a German auxiliary cruiser of 3,000 tons, and ten armed trawlers. A smart action ensued. In ten minutes the cruiser had been set on fire and abandoned by her crew, and the trawlers had been sunk. Many survivors were rescued. The cruiser blew up.

In the Heligoland Bight on 17th November 1917, about sunrise, British light forces sighted and chased enemy light cruisers, destroyers and minesweepers. The British destroyers, overhauling and attacking the enemy, sank a mine-sweeper — rescuing survivors — set fire to a cruiser, caused an explosion on another and damaged a third. The running fight continued under cover of a smoke screen for two hours but Heligoland was getting near, enemy battleships and battle cruisers were sighted and the British force retired. It had suffered very little damage. It had come — following the course of the enemy ships — through a passage in a great minefield. Through the same passage it went back.

The two Norwegian convoys. Across the stretch of sea between the Shetlands and the coast of Norway it had become, since April 1917, the practice of the British to convoy merchant ships. At 7 a.m. on 17th October 1917 the two escorting destroyers, Mary Rose and Strongbow, were attacked when nearing the Shetlands, by two very fast and heavily armed German raiders. The destroyers fought until sunk — it was a short and unequal engagement — thus enabling three of the escorted ships to get away. The other nine were sunk by the gunfire of the raiders who, in their hurry to escape, rendered no help to survivors. British patrol craft, arriving shortly afterwards, rescued many men of the escorted ships and about a fourth of those on the destroyers. The destruction of the wireless equipment of the escort had prevented their summoning assistance. The raiders succeeded in evading the British watching squadrons and getting away.

The Mary Rose was astern of the convoy. Her captain was Lieutenant-Commander Charles Fox. When he heard the firing he supposed it was a submarine and he went full speed towards it. Out of the mist appeared two enemy light cruisers coming swiftly towards him. He held on at full speed, through a barrage of bursting shell, till within a mile of the enemy. The Mary Rose — turned to bring her torpedo tubes to bear — was struck by a salvo and disabled. Her last torpedo was fired. Her one remaining gun was kept firing — the captain cheering on his men — as long as it would bear. Then the Mary Rose went down with her colours flying. A few men escaped on a Carley raft.

There is no record — so says the official report — of what was in the mind of the captain of the Mary Rose when he made that single-handed dash, in the face of preposterous odds, and set aside considerations

of higher strategy. He might not have acted as he did if he had not at first thought it was a submarine. But he had started on his headlong course. An impulse carried him on. He would see if he could not torpedo one of the cruisers which were going to shell and sink the convoy. "He died", — again to quote the official report — "leaving to the annals of his service an episode not less glorious than that in which Sir Richard Grenville perished."

A second convoy was attacked at mid-day on 12th December 1917 — while outward bound — by four German destroyers. The British destroyer Partridge was hit and quickly blew up and her consort the Pellew was partly disabled. The raiders then sank four armed trawlers which formed part of the escort and also the convoy of six merchant ships. A second convoy of merchant ships which was also covered by the escort was not attacked. The raiders picked up survivors from the Partridge and from two of the trawlers. The crew of another trawler was saved in their own boat and many survivors of the merchantmen got to Norway in their boats or were picked up by British destroyers which arrived on the scene. This time there was no destruction of wireless. The escort above mentioned was the anti-submarine escort. A cruiser escort against surface vessels "was not on the scene of action in time to prevent the destruction of the convoy."

That same morning, about 4.30 a.m., two British steam trawlers had been attacked — and one of them sunk — off the coast of Northumberland by enemy destroyers. Shortly afterwards two neutral merchantmen were sunk. This attack was probably meant to draw off attention from the Norwegian convoy.

In both the main raids the information of the enemy as to the sailings must have been remarkably good.

Occasional successful raids are a feature of naval warfare. In six months about 4,500 vessels were convoyed to and from Norway without many losses occurring. But on both the above occasions the British scouting was defective in spite of the knowledge that the spy system in Norway was remarkably efficient.

The Goeben and the Breslau. On 20th January 1918 the Goeben and Breslau, coming out of the Dardanelles, made for Kusu Bay — in Imbros — where lay British monitors. British destroyers attempted to cover the monitors by a smoke screen but the monitors Raglan and M. 28 were sunk. The enemy made off. The Breslau ran into a minefield and was sunk. Turkish destroyers and an old cruiser issued from the Dardanelles, but were driven back by the destroyers Tigress and Lizard. The Goeben headed for the Dardanelles. She struck a mine, was damaged and was beached at Nagara Point. The submarine E. 14, sent to destroy her, was sunk off Kum Kale. The Goeben was several times bombed by naval airmen, but was eventually refloated and went back to the Bosphorus.

The Straits of Dover. (1918). Soon after midnight on the 2nd February 1918, the inhabitants of towns near the Straits of Dover were awakened by violent gunfire. Seven drifters and a trawler, engaged at the moment in hunting a submarine, had been attacked by a flotilla of enemy destroyers, and were sunk.

Zeebrugge and Ostend. On the evening of 22nd April 1918, a strange collection of vessels sailed from Dover and other ports near it. The composition of the expedition will be clear from what follows.

The inland harbour of Bruges is connected by canals

with the fortified harbours of Zeebrugge and Ostend, and the whole system formed a base for submarines and destroyers. The main object of the expedition was to block the two entrances of the canals.

The coast at Zeebrugge runs from N. E. to S. W. The Zeebrugge mole, 1½ miles long, runs curving out to sea and partially encloses the harbour to the N. E. At. 11.40 p.m. coastal motor boats ran into the harbour and laid smoke floats in order to produce a "fog". Only their small size and great speed saved them from destruction by the fire which was opened on them from the shore and from destroyers in the harbour. The wind had been from the N. E. but it died away and afterwards came from the S. W. and was thus unfavourable to the success of the expedition.

At 12.1 a.m. on the 23rd April — St. George's Day — the old cruiser Vindictive was laid alongside the mole near the seaward end and was pushed close in and held in position by the Liverpool ferry steamer Daffodil. This and all the subsequent events were done under heavy fire from guns and machine guns. Star shell constantly fired by the enemy illuminated the harbour and mole. Storming parties were landed by means of "brows" — the mole was 30 feet below the deck of the cruiser — special mole anchors were got into position, brows and anchors were smashed by gunfire and the movement of the ships. Parties from the Daffodil and Iris — another ferry steamer — landed across the Vindictive. The object of the storming was to divert attention from the blockships and incidentally to do damage to the mole and its batteries. The former object was achieved; the latter was not achieved to any great extent, chiefly because the position where the Vindictive was laid alongside the mole was not quite the position intended.

In order to prevent the enemy on shore from sending reinforcements to the mole, an old submarine — C. 3 — was run under the viaduct which connected the mole with the shore and blown up, the crew coming away, before the explosion, in a skiff — under fire and suffering casualties — and reaching the picket boat which was waiting for them.

The blockships were the cruisers Thetis, Intrepid and Iphigenia. The Thetis after rounding the head of the mole ran into nets suspended from barges, carried them away, had her engines stopped, swung round and grounded; and being holed by gunfire and apparently sinking, was sunk by order of her commander, those on board coming away in a cutter — crowded and holed — and reaching a motor launch which was lying near. The Intrepid and Iphigenia entered the canal, were manoeuvred into position, and duly sunk, those on board coming away in cutters and being taken on board motor launches — one of which came right into the canal — all being more or less under fire and suffering casualties.

The Vindictive's searchlights, which were to have given 20 minutes notice of the signal for withdrawal, had been shot away, and also her syren. The signal was given, at 12.50 a.m. by the Daffodil's syren. The withdrawal was duly effected. The Iris, crowded with men, came under heavy fire.

The Cruisers Brilliant and Sirius were taken across to Ostend as block ships, but the Stroom Bank buoy, by which they were to have been guided, had been shifted by the enemy. The cruisers, out of their course and under heavy fire from the shore, ran aground in the shallow water some 2,400 yards east of the canal entrance, and were blown up. The crews were taken

off by motor launches which had been standing by under heavy fire.

The whole expedition had required and received the most careful preparation. The Daffodil and Iris were selected because of their capacity, power and small draught. The smoke boxes were specially designed. Many of them were sunk by the enemy's fire, especially when, as often happened, they emitted flame. The expedition could only be undertaken under proper conditions as to darkness, tide and wind. Several times it had to be postponed when ready to start. It had actually to cover a great distance in broad daylight. For this reason great numbers of aircraft scouted around it. Of any newly laid mines the ships had to take their chance, though arrangements were made for life saving. From 11.20 p.m. the enemy positions at both Zeebrugge and Ostend were bombarded by monitors — French torpedo craft co-operating — and by British guns in Flanders. At a point on the route of the expedition, a force of destroyers was stationed to afford defence and to maintain aids to navigation as the squadron passed and returned. The Harwich destroyers were posted so as to prevent any interference from the northward. Other destroyers covered the flotillas of smoke-screening small craft. Others again covered the Vindictive from torpedo attack during the storming of the mole.

Such were the achievements on St. George's Day. The British losses in ships were the destroyer North Star and a motor launch. Some thirty dead were left on the Zeebrugge mole.

Early on the 10th May the Vindictive, under heavy fire and under cover of smoke screens, and to the accompaniment of heavy bombardment by monitors and

programme included fifteen very big capital ships which were building. Great Britain's programme included only four new ships. In order to conform to the above ratios the United States agreed to scrap nearly all of her capital ships which were building. This announcement, made at the opening of the Conference, marked the day as one of immense importance.

Japan had just launched the Mutsu, a battleship of 33,800 tons. She was unwilling to scrap it but agreed to scrap a smaller one — the Settsu — instead. This arrangement raised the figures all round. The British Empire which would have abandoned all four of the new ships on her programme, abandoned only two of them. The United States arranged to retain two of her uncompleted capital ships, which she would have scrapped, and to scrap two older ones instead. The displacement figures of capital ships finally agreed to were; — United States and the British Empire, 525,000 tons each, Japan 315,000 tons. France and Italy 175,000 tons each. The ratios are 15, 15, 9, 5, 5, and these will be the actual numbers of the ships if all are of 35,000 tons. Italy's strength in capital ships has never equalled that of France, but it was decided to allow of its becoming equal. All the figures refer to "standard displacement" (see below). Computations in "metric tons" give figures which are about 1.5 per cent higher.

The above displacements will not be worked to at once. The United States will have, for the present, 500,650 tons (18 ships) which includes one post-Jutland ship. The British Empire will have 580,450 tons (22 ships), the excess being, no doubt, considered fair because of the greater age of her ships. When either country builds new ships, she will scrap older ships as noted below. Japan will have for the present 301,320 tons (10 ships) which includes two post-Jutland ships.

France [1] and Italy will have respectively 219,405 tons (10 ships) and 158,980 tons (9 ships) none of the ships being post-Jutland. Lists of all the above ships are given below. Italy's figure is below that allowed by the Treaty. The other countries will, in their building and scrapping arrangements, effect reductions towards the figures allowed by the Treaty.

The following provisions refer to the five Signatory Powers — also called Contracting Powers. When reference is made to a non-Contracting Power this will be made clear.

As regards aircraft carriers, the Treaty limits the total displacement for the United States and the British Empire to 135,000 tons each, Japan 81,000 tons, France and Italy 60,000 tons each. Regarding the total displacements of cruisers, destroyers, submarines and vessels of any other kind than capital ships and aircraft carriers, the Treaty imposes no limits.

The Treaty provides that no capital ship to be laid down in future shall have a displacement of more than 35,000 tons.

Also that no vessel of war of more than 10,000 tons displacement, other than a capital ship or aircraft shall hereafter be constructed or acquired.

The displacement of any aircraft carrier future may be constructed or acquired, is ' 27,000 tons, but any of the Powers may buil than two aircraft carriers of 33,000 tons each utilise for the purpose any of their capital s or building, which would otherwise have to be under the Treaty.

No gun carried by any ship of war shall exc inches in calibre.

No aircraft carrier shall carry a gun with a

[1] France has recently lost one ship see page 239.

in excess of 8 inches. If any of the guns have calibres over 6 inches the total number of guns is limited to ten in ships of not over 27,000 tons and to eight in bigger ships. In any case, guns of 5 inches or less — this includes anti-aircraft guns — are not limited in number.

No vessel hereafter laid down, except a capital ship, shall carry a gun of more than 8 inches calibre.

Thus, although the limiting of the total displacements is confined to capital ships and aircraft carriers, the Treaty puts a distinct limit to the sizes of ships and of guns.

The following definitions are given in the text of the Treaty. The standard displacement of a ship is the displacement (in tons of 2,240 lbs) when the ship is complete and fully equipped with everything including fresh water for the crew, but without fuel or reserve feed water. A capital ship, in the case of ships built hereafter, is one — not an aircraft carrier — whose displacement exceeds 10,000 tons. An aircraft carrier is a ship, of over 10,000 tons displacement, designed for the exclusive purpose of carrying aircraft.

Another question discussed at Washington, was that of submarines. The British delegates proposed the prohibition of their use. This was not agreed to. It was argued — with very great force — that they are necessary at least as a defensive force and especially for a country which is weak in capital ships. In the course of the argument it was said that large submarines are necessary in order that the crews of vessels attacked should be rescued and because a large radius of action is needed to protect distant colonies. A proposal to limit the number of submarines was rejected because of the attitude of France who insisted on being permitted to have a very large number. In the absence of limitations of submarines, it was not possible to limit "auxiliaries to capital ships"

such as destroyers and light cruisers. These, also, it was argued, were defensive forces.

The Treaty decrees a 10 years "Naval Holiday" from 1921. Except for the building of the few capital ships, mentioned above, to replace others, the general building of capital ships to replace old ones, may not begin till 1931. It may continue for twelve years after that. As regards cruisers and smaller ships there is of course no naval holiday. A good deal of building may go on. The light cruiser has now increased up to a displacement of 9,750 tons — in a few cases — in the British Empire and to 8,000 tons (building) in France. There may be some competition in the building of these and other ships. Eight years after the Treaty has been ratified by the Powers concerned — this will probably be in 1923 — a fresh Conference is to assemble to consider what changes, if any, in the Treaty are necessary to meet the technical and scientific developments which may have occurred by then.

Any Contracting Power may build ships of war for a non-Contracting Power, provided the size and armament are not in excess of those laid down in the Treaty. Any such ship not completed or not delivered may not — if war breaks out — be used as a vessel of war by the building Power. No Contracting Power may transfer a ship of war to any other Power for use as a ship of war.

If a Contracting Power becomes engaged in a war, it may, after notifying the other contracting powers, suspend most of its obligations under the Treaty. In this case, or in the case of any great change of circumstances affecting any Contracting Power and duly notified, there will be a fresh Conference.

A separate Treaty prohibits, as among the Signatory Powers, the use of poison gas, or the like, in war. It also

declares, as an established part of international law that a merchant ship may be seized — by a surface vessel or a submarine — only after a visit or search, and may be attacked only if she has resisted search or refused to proceed as desired; and that she may not be destroyed until all on board have been placed in safety. The Treaty further states that it is practically impossible to use submarines as commerce destroyers without violating the existing law and it enacts that submarines shall not, as among the Signatory Powers, be so used. The Signatory Powers invite all other civilised nations to agree to all the above prohibitions.

The Treaty further declares, in regard to attacks on and destruction of merchant ships, that anyone in the service of "any Power", violating any of the above existing rules of war, shall be liable to be treated as a pirate and tried by any Power in whose jurisdiction he may be found.

A committee of the Conference came to the conclusion that it is not at present practicable to limit the numbers or characteristics of aircraft, but rules as to their use will fall within the scope of the Committee on International Law mentioned in Chapter IV. Art. 1.

The details of the existing capital ships are shown in the accompanying statement and notes. Post-Jutland and pre-Dreadnought ships are specially noted. The most recent ships in any group are mentioned first, then the next newest and so on. A comparative statement of the ships — of all kinds — of all the great naval Powers is also given. It includes all ships building, or projected and likely to be soon proceeded with.

The United States and Japan are each about to convert two of their scrapped battle cruises. — The Lexington and Saratoga (or Constellation) and the Amagi and

Akagi — into aircraft carriers. The designed displacements of the American ships were 43,500 tons and of the Japanese 42,000 tons, but they will be reduced to about 33,000 tons because of the abolition of the armaments. They will have very great speed and will each be able to carry over 100 aeroplanes. The aircraft carrier figures in the comparative statement and notes of course include the above vessels. The British ships are (existing) the Pegasus, Ark Royal, Argus and Furious, of 3,070, 7,080, 14,450 and 19,100 tons respectively and (building) the Eagle and Hermes of 22,790 and 10,950 tons. The Hermes is the only one which was from the first designed as an aircraft carrier. This indicates that very great size is not now aimed at; no doubt because of the limitation of the total displacement. The Furious, was to have been a sister to the Courageous and Glorious She it was who, with her great freeboard and immense expanse of deck, excited the astonishment of the German sailors when they were coming across to surrender their fleet. The United States existing vessel — the Langley — is of 19,360 tons and was converted from a collier. The Japanese ship — the Wakamiya — is of 7,600 tons, one building is of 9,500 tons and one projected — as also the French ship — is of unkown displacement.

Art. 2. Ships, submarines and aircraft. Ever since the Great War, the nature of future warfare has been debated, and in particular the question whether capital ships are of use any more. It is asserted by some that the submarine, and by others that aircraft will now dominate the capital ship and that to build more such ships is useless, especially in view of their greatly increased cost. Others are quite of the contrary opinion. On either side there are naval officers of high rank and of war experience. The arguments deal with the capabilities for

CAPITAL SHIPS

No. of ships	Average Displacement of each (tons)	Size of Gun	No. of Guns per ship.	Total Tons	Remarks.	Reference to Notes on opposite page
British Empire						
	35,000(?)	16-in.(?)			2 ships projected	
10	26,600	15-in	8	266,250		(1)
8	24,000	13.5-in.	10	191,500		(2)
3	31,400	15-in.	8 & 6	94,200	Battle cruisers	(3)
1	28,500	13.5-in.	8	28,500	Battle cruiser	Tiger (29-knot)
22				580,450 tons (See Note 4)		
United States						
1	32,600	16-in.	8	32,600	2 more building	(5)
11	30,200	14-in.	12 & 10	332,050		(6)
6	22,700	12-in.	12 & 10	136,000		(7)
18				500,650 tons (See Note 8)		
Japan.						
2	38,000	16-in.	8	67,600		(9)
4	30,930	14-in.	12	123,720		(10)
4	27,500	14-in.	8	110,000	Battle cruisers	(11)
10				301,320 tons		
France.						
3	23,200	13.4 -in.	10	69,531		(12)
3	23,600	12-in.	12	70,800		(13)
3	18,500	12-in.	4	55,494	Pre-Dreadnoughts	(14)
9				195,800 tons.		
Italy.						
5	21,700	12-inch.	13 & 12	108,360		(15)
4	12,700	12-inch.	2	50,620	Pre-Dreadnoughts	(16)
9				158,980 tons.		
Russia.						
6	23,700	12-inch.	12	141,900		(17)
4	32,500	14-inch.	12	130,000	Battle cruisers	(18)
4	15,100	12-inch.	4	60,480	Pre-Dreadnoughts	
14				332,380 tons (See note 19)		

NOTES.

[1] Royal Sovereign, Ramillies, Resolution, Revenge, Royal Oak; Queen Elizabeth, Barham, Malaya, Valiant, Warspite. The last five are 25-knot ships.

[2] Iron Duke, Benbow, Emperor of India, Marlborough (these four have the heavier guns); King George V., Ajax, Centurion, Thunderer.

[3] Hood (post-Jutland, 31-knot, 8 guns); Repulse, Renown (both 32-knot, 6 guns).

[4] Further details concerning many of the ships are given in Chap. III. Art. 5 and in Chap. VI. Art. 6. When two new ships (total say 70,000 tons) are built, the 4 ships, King George V., &c., will be scrapped. The British Empire will then have 558,950 tons. (20 ships)

[5] Maryland (post-Jutland).

[6] California, Tennessee, Idaho, Mississippi, New Mexico, Arizona, Pensylvania, Nevada, New York, Oklahoma, Texas.

[7] Arkansas, Wyoming, Florida, Utah, Delaware, North Dakota.

[8] The Delaware and North Dakota are to be scrapped and two like the Maryland completed. The United States will then have 525,850 tons (18 ships).

[9] Mutsu, Nagato, (both post-Jutland).

[10] Hyuga, Ise, Yamashiro, Fuso.

[11] Kirishima, Haruna, Hiyei, Kongo (all 28-knot).

[12] Bretagne, Lorraine, Provence.

[13] Courbet, Jean Bart, Paris. Battleship France, of the same class, lost by grounding off Quiberon, 26th. Aug. 1922.

[14] Condorcet, Diderot, Voltaire.

[15] Andrea Doria, Caio-Duilio, Conte di Cavour, Guilio Cesare, Dante Alighieri.

[16] Roma, Napoli, Vittorio Emanuele III., Regina Elena.

[17] General Alexieff, Paris-Commune (ex-Sevastopol), Marat (ex-Petropavlosk), Poltava, Gangut, Demokratiya.

[18] Navarin, Borodino, Izmail, Kinburn (all 27-knot).

[19] The capital ships of the Russian navy have little present efficiency, all the battle cruisers and one of the recent battleships being unfinished (construction stopped) while two other recent battleships and one pre-Dreadnought are denuded of guns or machinery. The Germans have recently been helping the Russians to put some of the ships in order.

COMPARATIVE STATEMENT OF NAVAL STRENGTHS.

(INCLUDING SHIPS BUILDING AND PROJECTED).

Kind of Ship	British Empire	United States	Japan	France	Italy	Russia	Germany
Battleships	16	18	6	6	5	6	—
Battle Cruisers	4	—	4	—	—	4	—
Pre-Dreadnoughts	—	—	—	3	4	4	8
Total Capital ships	20	18	10	9	9	14	8
Cruisers	3	10	—	7	4	5	—
Light Cruisers	58	19	25	8	11	9	4
Monitors & Armoured Coast Defence Ships	5	—	5	—	8	—	—
Aircraft Carriers	6	3	5	1	—	—	—
Flotilla Leaders	18	—	—	7	11	—	—
Destroyers	190	319	87	67	57	46	16
Torpedo Boats	68	—	—	—	77	—	16
Submarines	101	142	56	62	47	43	—
Sloops	30	—	—	8	—	1	—
Coastal Motor Boats	33	2	2	2	—	—	—
Gunboats & Despatch Vessels	—	5	4	72	7	4	—
River Gunboats	17	2	8	5	4	33	—

NOTES.

For information concerning the general displacements and armaments of ships other than capital ships and aircraft carriers, see articles quoted below.

Cruisers (Chap. III. art. 5). The 3 British ships include the Courageous, and Glorious, each of 18,600 tons with four 15-inch guns. Excluding these the average displacement of a cruiser — all countries — is 12,000 tons.

Light Cruisers (Chap. III. art. 5). The numbers building are Britsh 8, Uniited States 10, Japan 13, France 3, Russia 8 (work stopped on 5) Germany 1. France and Italy each have 5 ex-German

or ex-Austrian ships. The average displacement of a light cruiser is 5,000 tons.

Monitors and Armoured Coast Defence Ships (Chap. III. art. 5). Three British monitors, Erebus, Terror and Marshal Soult, are of 8,000, 6,000 and 6,670 tons respectively and each carry two 15-inch guns. The other two are of only 355 tons each. Of the Italian monitors one is of 2,809 tons and carries two 15-inch guns. The others are of only 360 to 575 tons with one 12-inch or 15-inch gun apiece.

The Japanese ships — coast defence — are old cruisers, one with four 12-inch guns, the others less heavily armed.

Flotilla Leaders (Chap. III. art. 6). France has 1 (ex-German) of 2,340 tons and 6 building (projected) of 2,350 tons each. Of the Italian ships 1 (ex-German) is of 2,290 tons and 3 are building.

Destroyers (Chap. III. art. 6). The numbers building are 6, 3, 28, 13, 7, 23 (work nearly all stopped) and 0. A few of the British and American and most of the Japanese vessels (existing) are of medium displacement (say 600 to 900 tons) the rest being 1065 to 1350 tons (British and Japanese) and 1014 to 1215 — mostly 1215 — tons (American). The American vessels, numbering 264, are of very recent date and each has 4 triple torpedo tubes. A note on the official list states that 52 of the older vessels are to be considered as obsolete. The latest British vessels have 2 triple tubes and those building are to have the same.

Submarines (Chap. III. arts. 7 & 8). Germany has none. The numbers building in the other countries are 8, 38, 32, 12, 4 and 20 (the last nearly all stopped). The following figures are those of the surface displacements. In all countries the sizes are numerous and vary from small to big, the smallest ranging from 245 tons (Italy) to 364 tons (British); the biggest from 650 tons (Russia) to 2,114 tons (United States). Of these last there are 3, the next biggest being of 1106 tons. The biggest British vessels — 6 in number — are of 1,880 tons, Japanese 740 tons, Italian 840 tons, French 2,000 tons. Of this last there is only one, an ex German submersible cruiser, the next biggest being of 1,140 tons.

Torpedo Boats and Other Small Craft (Chap. III. art. 6). The numbers building are small but include all the 7 United States vessels. The Russian river gunboats are probably of no military value.

offence of big ships, submarines and aircraft and with possible methods of defence. In the present article the chief points for and against each kind of craft or weapon will be gone over, and an attempt made to arrive at some conclusions.

Torpedoes. When the torpedo was first used — by torpedo boats and big ships — it was expected that it would be the determining factor in a naval battle. It has by no means proved to be so. Against it there is the visibility of its wake, the uncertainty of the aim, the difficulty — in the dark or in conditions of low visibility — of distinguishing friend from foe, and the counter attack by other vessels. It is expected that torpedoes will increase in size and range and be made to carry a ton of explosive. It has been suggested that the track of a torpedo may possibly be made invisible but this is a mere surmise. There is nothing to indicate how it can be done. It is, however anticipated that a number of improvements may be effected in the torpedo in order to ensure an explosion occurring when it hits its mark. On the other hand it is urged that anti-torpedo arrangements in big ships have been already, and will be further improved. A recent invention enables a torpedo to turn at right angles in the water so as to strike its target on the broadside.

Submarines. Submarines became of fighting value only a short time before the war. Tirpitz would have us believe that, in consequence, the results achieved by submarines during the war were valued too highly.

As regards their achievements against capital ships, Sir Percy Scott has stated in the "Times" that submarines "can sink a surface fleet" and so prevent the fleet's performing this or that operation. There is very

great difference of opinion as to this. It has been pointed out that in the war the achievements of the German submarines against recent capital ships were almost insignificant. The submarines were chiefly occupied with attacks on merchant ships, but even when they were specially detailed for watching and attacking the Grand Fleet, they succeeded neither in seeing the Grand Fleet coming out — on the day of the battle of Jutland — nor in doing it appreciable harm when it came out. (Chap. VI. Art. 6.) Submarines can of course, compel a fleet to keep moving quickly, and to have destroyers to protect it. Jellicoe's turn-away at the Battle of Jutland was not due to fear of submarines, but to avoid a stream of torpedoes from destroyers.

It has been pointed out that a submarine cannot keep station in a convoy. She cannot be seen and there is every chance of a collision. Two or more submerged submarines cannot properly act together. The blindness of a submarine is a grave defect. She is extremely vulnerable when on the surface and is comparatively useless in rough weather.

On the other hand, German submarines in the war, though they were not very successful against fast and small ships like torpedo craft, sank altogether some dozen of them. Of merchant ships they sank over 6,000 mostly at points more than 1,000 miles from the German bases. They sank the following warships (Chap. VI. Arts. 2, 4, 5, and 6) which were patrolling or engaged in some other duty and not merely passing by at high speed: — the old battleships Formidable, Majestic, Triumph, Britannia, Cornwallis, Suffren, Gaulois and Danton; the cruisers Aboukir, Hogue, Cressy, Hawke and Drake besides four French and one Russian cruiser; the light cruisers Pathfinder, Nottingham and Falmouth, and fully a dozen auxiliary cruisers.

It has been said by some writers, that if the Germans had had 100 submarines at the commencement of the war the Allies would have lost it, no matter how many battleships they had had. Also that the Germans ought to have armed their submarines chiefly with guns. They would then have been far more effective against merchant ships. The Germans used chiefly the torpedo because they had experience of that type of submarine They had one or two submersible cruisers with guns. Scheer has observed that twenty such vessels in the Atlantic would have destroyed Great Britain's trade.

As regards the future it is anticipated that submarines will be bigger. A submersible cruiser of 3,000 tons submerged displacement already exists. A similar one with a sea endurance of 50,000 miles has been suggested. Such a vessel is slow in diving and can only dive in deep water, and her size increases her liability to be hit by guns, torpedoes and bombs. A submersible battleship — that is an armoured submersible ship — has been spoken of. Sir Percy Scott mentions a design — pronounced by an expert to be feasible — of a submersible battleship of 10,000 tons. Presumably the armour would be rather thin.

One writer asserts that there is a new invention which will give a submarine better means of propulsion. It is also argued that, at a great distance from bases, the host of small craft used in the war to attack submarines will not be available. During the war the geographical position of Great Britain gave her an enormous advantage. The actual and expected increases in the power and reliability of the torpedo have been mentioned above.

On the other hand fresh anti-submarine devices (Chap. III. art. 9) have been matured, and a broad channel can now be closed to submarines by simpler means than

laying a barrier of mines. A submarine can now, more easily than before, be located and compelled to fight. In big ships, as above mentioned, very great attention is being paid to anti-torpedo devices. The war ended too soon to show the final value of the submarine. Her greatest future enemy, aircraft, is being rapidly developed.

Aircraft. These have been discussed in Chapter III. art. 4. Bomb-dropping is at present far from accurate, but it is becoming more accurate and will be effective against submarine bases. Recent experiments in the United States have shown, as already mentioned, that a heavy bomb dropped close to a ship has the same effect as a mine. Anti-aircraft guns, though they compel the aircraft to keep very high, do not stop a well-led and powerful air squadron. The unknown factor of height makes aircraft — at least heavier-than-air craft — a very difficult mark for the gunner. The best defence against aircraft is a counter-attack by aircraft.

As to the future, aircraft during the war were not nearly so fully developed as submarines, and forecasts as to them are therefore more conjectural. Airships will, under some conditions, make the best long-distance scouts from shore bases, especially if filled with non-inflammable gas. Sir Richard Glazebrook has recently pressed for more extended research in connection with them. In heavier-than-air craft great developments are anticipated. Reliability in bad weather, size, speed, radius of action and weight-carrying capacity will all become far greater than at present. Wireless will be more used. Flying at greater heights will be possible. This will enable great speed to be attained by diving. Organization for night flying will be improved. M. Louis Brequet has stated, in a lecture, that the future aeroplane will have a longer life and so effect great saving in

money, will weigh 20 to 40 tons and burn a cheap heavy oil. Bomb-dropping is expected to attain much greater accuracy, as well as the projection of shells from tubes. It will be possible to drop torpedoes and depth charges from greater heights than is now possible. Torpedo-carrying aircraft, descending to fire off torpedoes at a ship, can be hidden by a smoke screen raised by other aircraft. They can come at twilight or by moonlight and in great numbers. Stress is laid on the fact that in the British experiments, hits were obtained from a height of 8,000 feet, and that even in war a capital ship will sometimes have to lie at anchor and may even be lying in a known harbour.

Per contra it is urged that the torpedo-carrier, low down and not far off, will be a good target for the ship's guns, and can be shot down, and that barrages can be made by raising great jets of water by means of gun-fire. Also that — as already stated — the United States bombing experiments and others undertaken by Great Britain in the Channel in 1922 were not made under war conditions, and that a bomb to be dangerous to a ship must hit her in the right place. In war a ship would not be stationary and deserted by her crew, and even if she were lying in a known harbour the attacking aeroplanes would be fired at and attacked by other aircraft. The Ostfriesland could very likely have been saved if she had had a crew on board. A partial counter-reply is that in war an airman would drop his bombs from a less height than 8,000 feet and be more sure of hitting the ship.

Capital ships. The United States Joint Board on bombing experiments (Chapter III. art. 4) considers that it is impossible to construct a battleship which will be proof against the heaviest bombs, and it is admitted

that she cannot be proof against underwater attack. However strong the bulge may be, the bottom of the ship may be struck when she rolls. It can be imagined that a battleship of very great size might be made proof against torpedoes and bombs, but the size has now been limited. The greatest naval experts are, however, by no means in despair concerning the big ships. Sir Eustace D'Eyncourt at the summer meeting (1922) of the Institution of Naval Architects in Paris, has stated that a big ship can be made reasonably secure against underwater and air attack or bombs dropped alongside, and her decks against long range gunfire and against bombs, provided the ship is not required to carry too many guns and to have too great speed. In short gun-power and speed must be to some extent sacrificed in order to allow for more protection. Sir Philip Watts has, in a written statement, confirmed this view. It has been suggested that belt armour may be to some extent sacrificed in favour of deck armour. The suggestion was also made, by an Italian officer, at the above meeting that the protective elements in a ship can be to some extent incorporated in her structural features. The Board of Admiralty (1922) includes men of great professional talent and war experience and with long service afloat. They have decided that the capital ship can still hold her own and that the time for abandoining her construction has certainly not yet arrived. Other nations have come to the same conclusion. The number of those who argue in the press to the contrary has become very small.

Conclusions. There will be a tendency, as in the past, for everything to increase in size, though — as has been seen in the preceding article — a limit to the sizes of capital ships and their guns has been put by

the decision come to at Washington. The whole matter remains to some extent indeterminate. It is dependent not only on the relative degrees of development of the various weapons and of the craft which carry them, but also on the relative numbers which can come to fight. General statements, to the effect that the attack in the end always overcomes the defence, are erroneous. The claim for the torpedo has been already mentioned. Similar invincibility was claimed for the machine gun and the submarine. The big gun overcame the armour. It did not overcome the Dardanelles forts. The position nearly fifty years ago was somewhat the same as it is now. Thick armour could be holed and the big ship was said to be no longer of any use. The real reply to the big gun was, as has been mentioned before, the opposing big gun. Whatever arm develops there is the counter-attack by the same arm. It has been pointed out in the "Times" by Admiral A. W. Waymouth that the real effect of attacks on capital ships by aircraft cannot be ascertained in peace time. But having regard to the short time which has elapsed since aircraft began to develop, to the absence of any restrictions as to their size, to the numbers in which they can be produced and to the possibilities of modern science, there are excellent grounds for anticipating that aircraft will, before long, become an extremely powerful factor in naval warfare. It is already admitted that in future no fleet will move without aircraft carriers and aircraft.

Future warfare is now usually discussed on the assumption that the belligerent Powers will belong to two different continents. It is said that in such a case capital ships are useless. If the battleships of one country went across to the other, the probabilities are that they would arrive with insufficient fuel to admit of fast steaming, and they would be attacked by destroyers, shoals of submarines

and hosts of aircraft, with bombs, torpedoes and smoke screens. Blockades, as in previous wars, could not be set up. But war on trade will certainly continue. Suppose the enemy to be searching for convoys of merchant ships. He would use fast cruisers. They would, if spread out, be immensely superior to submarines for searching, and would be able also to effect captures. The convoy would also have surface ships with it, some of them probably being aircraft carriers. Whether submarines were present or not, there would be fighting between the surface ships. Some of these would be big, in order to be fast and heavily armed and to have great endurance. They would, in short, be battle cruisers.

As regards countries not far apart, the need for capital ships is obvious It one side (*A*) has capital ships, the other side must have them. Otherwise *A* could dominate a particular area of sea and drive off all lesser ships from it. Submarines cannot do this at present. It has been pointed out that in the absence of the Grand Fleet, German battleships could have entered the Straits of Dover, blocked Dunkirk, Calais, Boulogne and the berths at Folkestone, and destroyed all the shipping in the Downs. Submarines would not have prevented this. Submarines can merely compel a fleet to keep moving. If a capital ship can be easily destroyed by submarines and aircraft, then all surface ships — including aircraft carriers — can be similarly destroyed. Only submarines will remain, and such aircraft as can fly out from a shore base.

Suggestions have been made to the effect that aircraft will soon supersede all floating ships. The idea is untenable. Trade will continue to be carried on the sea, and it will have to be protected. Commander Carlyon Bellairs has aptly remarked in the "Times" as follows: — "Vast as is the part to be played by aircraft, it is only men who do not understand war who think that they provide a

cheap substitute for sea power. Four-fifths of our food supplies reach us across the waters of three great oceans. The Empire is bound by oceanic routes, and to sacrifice the surface supremacy on these oceans is to smash our position for war."

It has also been suggested that floating ships will become auxiliary to aircraft, the striking power being in time transferred to the latter. This depends on unknown developments. At present aircraft are auxiliary to ships of war. The two arms must work together.

The British Admiralty are alive to the capabilities of aircraft. They have agreed to substitute an airship or two for a projected light cruiser. An airship can, as before stated, carry aeroplanes and thus get over the difficulty of the small radius of action of the latter. An airship permits of very rapid concentration when distances of over a thousand miles are to be covered. It costs only a third as much as a cruiser and can cover seven times the area.

It is generally agreed that in the next European war, victory is likely to fall to the power which is able to make a rapid offensive with aircraft and thus to destroy or paralyse the nerve centres of its enemy. Great Britain is of course vulnerable to this form of attack. Her great manufacturing centres are huddled together in the North. Her naval bases, harbours, docks, arsenals, food depôts and centres of military operations and civil government are easily reached. It is even possible that, in spite of the Treaty lately signed at Washington, chemicals to produce poison gas may become the chief means of offence and be carried in aeroplanes. It has been made abundantly clear by recent correspondence in the press, and particularly by the articles of Brigadier-General P. R. C. Groves and Admiral Mark Kerr, that Great Britain must have an aircraft force to strike at an enemy in his own aerodromes and nerve centres, and that air supremacy

— or, at least equality in the air with the enemy — is absolutely necessary for any country that is open to attack by air, and that such supremacy or equality can, in the case of Great Britain, best be attained by the development of civil aviation.

Great Britain's home strength in aircraft — some 12 squadrons — was until quite recently defective to a degree which was ludicrous. France has 126 air squadrons and a programme for increasing the number to 220. It has lately been decided to increase Great Britain's home strength by 20 squadrons. Even this is altogether below the number requisite. Though welcomed on all sides as a considerable step it must be considered as only a step. What is required in Great Britain is the further development of service aviation, the fostering of the aircraft industry and the encouragement of aeronautical research. A most necessary step — for financial reasons, for the sake of the industry, for the "larger policy", that is the improvement of communication among our scattered people — is the development of civil aviation. This has so far received little support from Government.

Great Britain's weakness in naval aircraft amounts to a weakening of her Navy. A Navy without aircraft is inefficient. Neglect of air power means the decay of sea power.

There is now an Air Ministry which supplies the needs of both Army and Navy. If ever the aircraft service becomes the principal one and the others auxiliaries, the need for a Ministry of Defence to exercise general control will — as pointed out by Commander C. Dennis Burney in the "Times" — be obvious. The British naval air force must be thoroughly trained at sea.

At present, and until the air strength of Great Britain is brought up to its full requirements, the country is once more in danger.

APPENDIX A.

NOTES ON AIRCRAFT.

Attention has recently been directed to the question of improving the safety of flying. This will obviously assist civil aviation and in fact is essential to it. The pilot must of course be well trained but at present far too much depends on him. From 1st January 1923, certificates of airworthiness will be required for all aircraft in Great Britain and not only for those employed in public transport. The daily maintenance certificate is still required only for the latter, instead of for all. Other steps advocated are the medical examination of pilots, the provision of more than one engine to each aeroplane, better inspection and upkeep of machines, the rigid restriction of the load carried and generally very strict control over passenger-carrying machines. Mechanical failures are largely preventible. It has also been urged that aeroplanes should be provided with parachutes and wireless telephones.

Regarding recent developments, French bombing machines are being built to travel some 2,000 miles continuously. The Germans are said to be about to build an immense trans-ocean flying boat with two hulls side by side; also a machine that will travel on land like a motor car, on the water as a boat and in the air as a flying boat.

The advantage which would be obtained by being able to hover over a ship is obvious. A type of flying machine which can rise straight up and can hover, was

invented some years ago. It has no screw propeller but has wings which flap or revolve. Several varieties were patented. The attention of the Ministry of Munitions was drawn to this fact during the war. A model of one variety was exhibited at Earls Court in 1915. A great defect of one variety, if not of all, is that if the engine stops the machine falls but this can possibly be remedied.

In experiments with gliders France has made considerable progress and German achievements have been brilliant. The durations of flights have gradually increased. Great Britain has taken the matter up. It is impossible to say in what direction aeronautics will develop.

A torpedo-carrying seaplane — more powerful than any in existence and to have a speed of 150 miles an hour — is being constructed by the Air Ministry. The size will not be great and it will not offer a large target to an enemy. The torpedo will weigh over a ton.

In recent American experiments, dummy torpedoes fired from seaplanes scored hits on the battleship Arkansas, nine times out of seventeen, the range being about 1¼ sea miles.

APPENDIX B.

THE NAVY LEAGUE.

The Navy League has lately stated its future policy. It is as follows: — To impress upon all British subjects the fact that the raw materials and most of the food supply of Great Britain are carried across the seas, and the necessity for maintaining the Navy at a proper strength and for regarding expenditure on it as an insurance such as everyone pays for in ordinary affairs; to watch the development of the Air Force and endeavour to ensure due co-ordination between naval and air force strength; to secure complete naval protection, all over the world, for British subjects and British commerce as well as to secure British prestige; to maintain training ships for boys who wish to enter the Navy or the Mercantile Marine, and also Sea Cadet Corps: to form branches throughout the British Empire.

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